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AN ANALYSIS OF THE DETERMINANTS OF HOUSEHOLD WASTE RECYCLING

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BEHAVIOUR



By

Laurence E.M. Wolfe M.Sc

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December 19th 2011

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Finally I would like to thank my wife Carol for her patience and faith in me on pursuing this journey.

AN ANALYSIS OF THE DETERMINANTS OF HOUSEHOLD WASTE RECYCLING BEHAVIOUR

ABSTRACT

Previous research has identified household recycling as being an important pro-environmental behaviour and that behaviour is influenced by a number of psycho-social determinants. Several behavioural models were evaluated for appropriateness in representing recycling behaviour. The Triandis Theory of Interpersonal Behaviour (TIB) was selected as it incorporates a diverse range of psycho-social components, identified in the literature review as being important to household recycling. The TIB has been successfully used in other areas of human behaviour and was considered a useful model for investigating household recycling behaviour.

This thesis presents research into household recycling behaviour in a UK local authority using a mixed-method approach. The research was conducted in phases commencing with scoping of the study area, analysis of secondary data from a large scale quantitative survey of households, and primary qualitative research through interviews with residents. It uses the TIB as a framework for presenting the findings.

Questions from the household survey were used as proxies representing TIB components and compared with the results from the household interviews to provide an in-depth exploration of household recycling. A key finding was that individuals demonstrated characteristics of one of two types of recycling behaviour based on effort and degree of self-restriction. Significant differences were observed between behavioural determinants in accordance with their recycling behaviour. This suggests that recycling behaviour may be associated with different levels of influence based on the disposition of the individual.

The research concluded that the TIB provides a useful way of framing the determinants of household recycling behaviour, and that its wider application could contribute to the understanding and practice.

Keywords: *Recycling, Waste Management, Determinants, Behaviour*

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CHAPTER ONE: Introduction

1.1 Introduction to the chapter

Feedback from surveys of public attitudes and behaviours has previously identified the environment as the fourth most important issue that government should be dealing with (Defra 2007b). People appear keen to reduce the environmental impacts of their waste, through what they buy and how they deal with waste in their homes and believe recycling would have a major impact on improving the environment. In the light of these observations, it was recognized by the UK Government (Defra, 2007a) that much greater effort is needed to encourage people to appreciate the importance of responsible waste management as a key element within a wider agenda to keep within environmental limits and to manage waste in more sustainable ways through waste prevention, re-use, recycling, and recovery of energy.

According to Davies (2001), humans are placed in a unique position to change the outcome of the impact they have on their environment through changing their behaviour, as they are both victims and the cause of most environmental problems. In terms of waste as an environmental problem Davies (ibid) suggested that behavioural change at an individual level should be associated with prevention, reuse and recycling of waste. A significant amount of research on household recycling behaviour has already been undertaken, however, a review by Davies (ibid) of previous research suggested that there is little consensus regarding which determinants best describe recycling behaviour. This statement is supported in that most studies investigating recycling behaviour involved examination of one or a few isolated factors (determinants). An alternative approach, involving a multi-faceted modelling of a comprehensive set of factors representing household recycling behaviour, would therefore assist in addressing the above shortcomings.

This thesis reviews waste management policy and practice, literature on research into waste behaviours and examines the key socio-psychological determinants of behaviours that influence and inhibit participation in household waste recycling. Behavioural determinants were investigated, analysed and modelled in order to illustrate the key components of behaviour and how these components vary between individuals. Through obtaining a better understanding of recycling behaviour, using the above approach, it is suggested by the researcher, in his waste practitioner capacity, that this would also assist in the improvement of intervention schemes to change behaviour and to enhance participation in household recycling programmes. In this regard the research question is:

“What are the key determinants of household recycling behaviour and what degree of influence do these determinants have on the behaviour of individuals with regard to participation in household recycling schemes”

As household recycling schemes in the UK are predominantly provided¹ by local authorities, the thesis focused on household waste recycling trends and practices in a UK local authority. This chapter sets out the context for the research in terms of the examination of household recycling behaviour in a local authority setting.

1.2 Waste policy drivers

Government surveys identified the UK as significantly behind many European countries in household recycling performance and diversion of residual waste to landfill (Strategy Unit, 2002; Defra, 2007a). This is suggested to be due to the UK having less of a commitment to recycling when compared to other European countries such as Germany, Austria and Belgium (Tucker, 2003, Davies 2001, Tonglet et al 2004).

¹ May be in-house via Direct Service Operation (DSO) or external service provider (contractor)

The UK Government stated in its Waste Strategy policies (Defra, 2007a, 2011) that the nation cannot continue to rely on disposal of waste including household waste, to landfill. There are a number of arguments supporting this statement however the main argument from Government and other agencies is that landfilling of biodegradable waste produces large quantities of methane gas, which negatively contributes to global climate change. Furthermore the UK is running out of landfill capacity for domestic (household) waste requiring the need for alternative processing and disposal technologies. Some parts of the UK simply do not have enough space to continue landfilling waste, with this problem being particularly acute in the South East of England (Defra, *ibid*).

There is also a need to protect high quality agricultural lands and the green belt from development, which further limits the opportunities for identifying land suitable for use as landfill. In addition, of the 26.2 million tonnes of waste produced from households per year, approximately 12.5 million tonnes ends up being landfilled while valuable energy is used in extracting and processing similar raw materials (Defra, 2010, 2011). In this regard for the UK there is an unsustainable coupling between waste growth and economic growth, which is not the case for other EU member states such as Germany. To address the problem of landfill capacity, meet EU targets and to sever the link between economic growth and waste growth, the Government's aim is to reduce waste at source through waste prevention, reuse and recycling before considering methods of disposal.

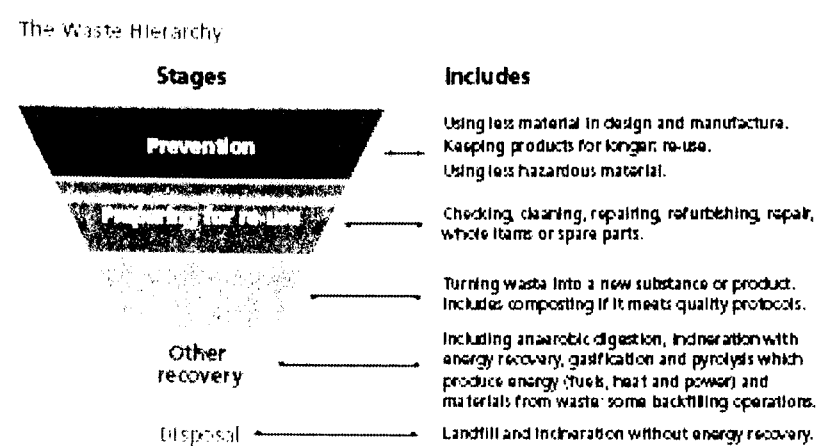
1.2.1 Waste legislation

There is a complex array of waste legislation at both European and national level, which sets out waste management Policy and Regulations. The legislation at national level was developed to ensure the UK meets its obligations under European law. This does not always seem to be fully co-coordinated and appears to be

continually updated due to changes in waste trends and Government changes to policy.

The 1992 Earth Summit held in Rio de Janeiro saw the development of Agenda 21 and identified lack of sustainable waste management as one of the greatest issues of environmental concern to the global community. This gave rise to the development of a framework of objectives to manage waste and incorporated the philosophy of waste prevention, waste recycling and promotion of environmentally sound waste disposal technologies (Watts, 2000) in an orderly framework or 'hierarchy' with waste prevention at the uppermost level of the hierarchy. The latest version of the waste hierarchy from Schedule 4 of the revised Waste Framework Directive, 2009 (Defra 2010, Defra 2011) has recently been incorporated into the UK Government's Waste Policy Review (Defra, 2011) and is illustrated in Figure 1.1. This provides both a guide to sustainable waste management and a legal requirement of the revised EU Waste Framework Directive enshrined in law through the Waste (England and Wales) Regulations, 2011.

Figure 1.1: The Waste Hierarchy – from Waste Policy Review 2011



UK Legislative framework for waste

To control emissions of landfill gas to atmosphere the European Union established ambitious targets under the EU Landfill Directive 99/31/EC². This requires all Member States (MS) to reduce the volume of biodegradable municipal waste (BMW) to landfill³. This places considerable pressure on UK local authorities to ensure maximum diversion of biodegradable household waste. The UK targets established under this Directive are:

- ◆ By 2010 to reduce BMW landfilled to 75% of that produced in 1995
- ◆ By 2013 to reduce BMW landfilled to 50% of that produced in 1995
- ◆ By 2020 to reduce BMW landfilled to 35% of that produced in 1995

Meeting the targets under the EU Landfill Directive presents a major challenge to the UK in which greater efforts to prevent waste and increase recycling, composting and energy recovery are required (Defra, 2007a). To meet these challenges a national target to recycle 50% of household waste by 2020 was established in the UK Government's Waste Strategy (Defra, 2007a). This has since been incorporated into the Waste Framework Directive (Defra, 2010) and Waste Policy Review (Defra, 2011). Meeting this national target of 50% recycling will require a fundamental step-change by householders in their recycling behaviour. In order to achieve this step-change there is a need to better understand the drivers to recycling behaviour and why people who intend to recycle fail to participate in recycling schemes. An improved understanding of why people recycle or do not recycle their waste would therefore assist Government and local authorities in meeting the national recycling target, through influencing changes in recycling behaviour. Whilst there has been a significant amount of work previously undertaken in identifying determinants of

² Official Journal of the European Community L182/1 16.7.99: The Landfill Directive (99/31/EC)

³ Municipal waste includes household plus street sweepings and other non-household waste.

recycling behaviour, a review of the literature (see Chapter 2) suggests that there is no clear agreement as to what are the key determinants of recycling behaviour. This thesis seeks to extend and build upon the findings from previous research into investigation, analysis and modeling of the determinants of household recycling behaviour.

1.3 Local government and household waste management

Local authorities deliver a wide range of key services to local residents of which many of these are front-line visible services including waste management and recycling, street cleansing and highways maintenance. Local authorities provide services to local residents in two distinct ways. The arrangement varies across the UK however for English local authorities (where the research for this thesis was conducted) this includes either a single tier “all-purpose council” structure responsible for all local authority functions (Unitary, Metropolitan or London Borough⁴) or a two-tier system, in which responsibilities for services are divided between District and County councils. The role of local authorities in England⁵ and their relation to household waste management is discussed in the following section.

1.3.1 Household waste in England

Municipal waste refers to all the waste from non-household and household sources including refuse and recycling collected by or on behalf of the local authority. The material included within the municipal waste fraction comprises:

- ◆ Household - collected by kerbside residual and recycling collection vehicles

⁴ Some London Boroughs are Unitary e.g. Bexley LBC however others are collection authorities served by London Waste Disposal Authorities e.g. North London WDA

⁵ Scotland, Wales and N. Ireland all have different arrangements to each other

- ◆ Other household sources- bulky wastes, clinical waste, fridges and freezers, etc.;
- ◆ Street sweepings, fly tips and litter collections;
- ◆ 'Bring' Banks, Household Recycling Centres⁶ (HRCs);
- ◆ Household garden waste collected or dropped off for composting.

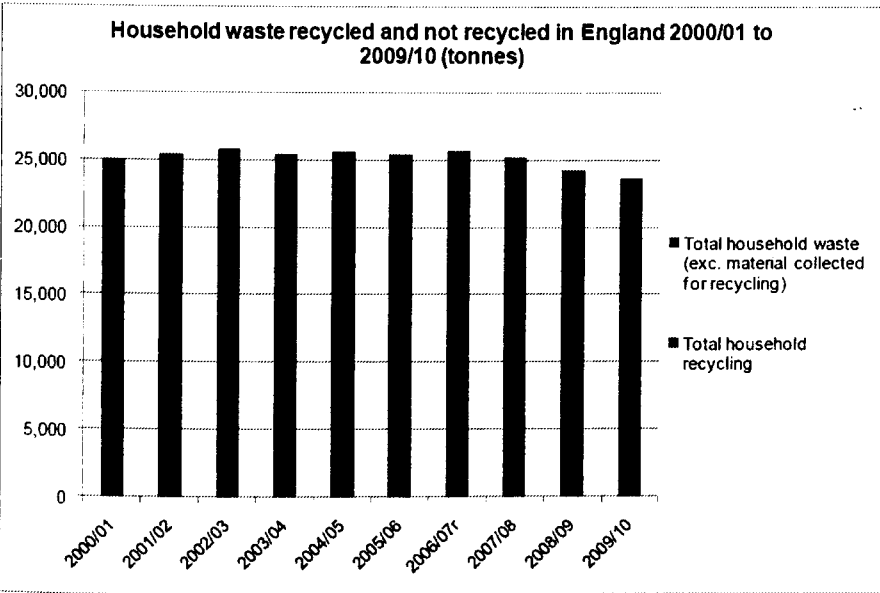
The definition of municipal waste however, changed in 2011 to reflect waste from other sources such as businesses which are similar in nature and composition to household waste. The new definition of municipal waste termed Local Authority Collected Municipal Waste (LACMW) includes household waste and business waste where collected by the local authority and which is similar in nature and composition as required by the Landfill Directive. Household waste includes waste from kerbside collections including refuse and recycling, garden waste and waste from Household Recycling Centres (HRCs). Recyclable materials collected vary by local authority for a number of reasons covered later in the Chapter, however typical materials collected include paper, card, glass, food and drinks cans and plastic bottles. Additional materials include textiles, shoes and tetrapacks (cartons); however, these additional materials are commonly collected through Bring Banks and HRCs. Waste statistics for England reported by the Department for Environment Food and Rural Affairs (Defra, 2008a) are obtained from the Defra website at:
<http://www.defra.gov.uk/statistics/environment/waste>.

Statistics for waste arisings in England in 2009/10 identified 88% of the 26.5 million tonnes of municipal waste generated is from household waste. Furthermore this represents a 2.7% reduction over the previous year (2008/09) suggesting either the growth rate of household waste is reducing or waste tonnages overall are decreasing. At the same time the proportion of household waste being recycled (including composting and reuse) continued to increase from 37.6% in 2008/09 to

⁶ Sometimes referred to as Civic Amenity (CA) Sites

39.7% in 2009/10. Household recycling tonnage is currently 3.3 times what it was in 2000/01 increasing from 2.8 million to 9.4 million tonnes. Figure 1.2 shows the 2009/10 national picture regarding proportion of recycling compared with total waste for England. This clearly indicates the steady increase in recycling of waste and reduction in overall waste arisings.

Figure 1.2 Household waste recycled and composted to 2009/10



Detailed information on waste trends from 2000/01 to 2007/08 is available at <http://archive.defra.gov.uk/evidence/statistics/environment/waste/wrindustry.htm>

This data is from e-Digest⁷, however, data after 2007/08 is summarised, with detailed information on waste trends post 2007/08 only available, on the Waste Data Flow website. The website receives quarterly data from the returns made by licensed waste management facilities to the Environment Agency (EA), and from municipal waste data as reported by local authorities. This information may be broken down by waste type and can provide an indication of the waste production down to individual authority level (the local authority that manages the waste).

⁷ Detailed information post 2007/08 on waste & recycling only available via (www.wastedataflow.org)

Household recycling performance in England

Table 1.1 illustrates household recycling performance by English Region for 2007/08 based on the type of household material sent for recycling (Defra, e-Digest).

Table 1.1 Household waste sent for recycling by English Region to 2007/08 (source Defra 2008)

Regional breakdown, 2007/8										thousand tonnes	
Household waste	North East	North West	Yorkshire and the Humber	East Midlands	West Midlands	East of England	London	South East	South West	England	% England
Paper & card	81	242	147	104	205	143	176	258	241	1,599	6.3%
Glass	44	105	87	83	76	125	68	178	135	902	3.6%
Compost	109	450	280	377	375	471	211	503	401	3,177	12.6%
Scrap metals/white goods	21	78	56	58	55	72	47	123	87	596	2.4%
Textiles	6	18	10	8	9	15	11	20	16	112	0.4%
Cans	6	13	9	7	8	11	5	7	18	83	0.3%
Plastics	4	12	6	6	3	7	8	6	13	66	0.3%
Co-mingled	30	131	68	203	82	264	265	354	65	1,461	5.8%
Other	59	153	101	70	64	62	60	79	91	740	2.9%
Total recycled (tpa)	361	1,202	764	915	879	1,170	851	1,528	1,065	8,735	
Total recycled (%)	28.5%	33.4%	30.5%	41.9%	33.0%	41.2%	25.5%	36.0%	40.3%	34.5%	34.5%
Total waste arisings	1288	3599	2504	2185	2662	2841	3342	4242	2644	25287	100.0%

From Table 1.1 compostable wastes⁸ appears to be the most common material collected for recycling (36% of total recycled) with the second most recycled material being paper and card at 18%. This recycling pattern varies from region to region where the South East has a relatively higher amount of recycling whereas the North East and London has the lowest. This may be attributed to London and the North East being highly industrialized with less green areas, which would favour collection of paper and card over other materials.

Sources and types of materials recycled from households

Tables 1.2 and 1.3 illustrate the tonnages of materials collected for recycling by source for England during the periods 2006/07 and 2007/08. Recyclable material from households is collected primarily via three major sources, which are kerbside collections, bring-sites and HRCs. A small amount of materials are also collected via private voluntary schemes.

⁸ Mostly garden waste, however may include cardboard and food waste from some collection schemes

Table 1.2 Household waste collected for recycling in England by source 2006/07 (source Defra 2008)

England, 2006/7

thousand tonnes

Household waste collected for recycling or composting	Kerbside collection	Bring site collection	CA site collection	Private/voluntary collection schemes ²	Total
Paper & card	1,075	211	222	27	1,535
Glass	430	346	60	4	840
Compost	1,749	14	1,129	68	2,895
Scrap metals & white goods	35	3	562	1	601
Textiles	12	36	31	25	103
Cans	62	9	9	1	80
Plastics	24	15	10	0	49
Co-mingled	1,209	26	3	3	1,241
Other	21	5	565	61	718
Total¹	4,616	664	2,592	191	8,063

1. Total amount of household waste collected for recycling is greater than that sent for recycling as some material is subsequently rejected during sorting or by the reprocessor.

2. Includes household waste collected from municipal parks, community skips and other methods of capture for recycling/composting.

Table 1.3 Household waste collected for recycling in England by source 2007/08(source Defra 2008)

England, 2007/8

thousand tonnes

Household waste collected for recycling or composting	Kerbside collection	Bring site collection	CA site collection	Private/voluntary collection schemes ²	Total
Paper & card	1,123	208	238	30	1,599
Glass	471	364	63	4	902
Compost	2,045	16	1,124	4	3,189
Scrap metals & w	30	2	565	1	598
Textiles	11	40	33	29	113
Cans	64	9	8	1	83
Plastics	32	20	14	1	66
Co-mingled	1,525	31	3	4	1,563
Other	15	7	539	167	728
Total¹	5,317	697	2,587	241	8,841

Notes as in Table 1.2

These tables show a sharp rise in kerbside collected co-mingled⁹ recycled materials in 2007/08 compared with the previous year. Co-mingled collection for most

⁹ Recycling materials collected in a single container and post-sorted at a Materials Recycling Facility (MRF).

recycling collection schemes involves householders placing all of their recyclable materials in a wheeled-bin; however other containers for recycling may be used including sacks and recycling boxes. It is also not clear from Tables 1.2 and 1.3 whether this increase in co-mingled recycling tonnage is due the provision of additional recycling capacity for the householder, or from the introduction of additional or extended co-mingled recycling schemes. From Table 1.3, as in Table 1.2, there is a difference between the tonnage sent for recycling and the material collected for recycling, due to rejection of material by the reprocessor during the sorting process. Table 1.3 also shows a sharp increase in compostable materials collected at the kerbside in 2007/08, compared with the previous year with marginal variation in compostable material taken to the CA Sites (HRCs). Again, it is not clear whether the increase is due to an increase in scheme uptake by residents or from the introduction of new or extension of existing kerbside garden waste collection schemes. Regardless of the reason for the increase in kerbside garden waste collected tonnages, there appears to be little impact on the quantities of garden waste being received at the HRCs. Finally, there is a slight reduction in the tonnage of scrap metals and textiles, which may be due to materials being taken to charity shops for re-use and from reuse schemes for Waste Electrical and Electronic Equipment (WEEE) items.

Local authority recycling schemes

The introduction of new legislation and Government policies places considerable responsibility on local authorities to change the way in which households deal with managing their waste. Delivery of successful household waste recycling schemes presents a major challenge to local authorities in terms of encouraging households to participate and to effectively deal with barriers associated with non-participation (WRAP, 2008). Current information from Defra (2010, 2011) suggests that more local authorities are moving toward collection of additional recyclable materials albeit at reduced collection frequencies. Some local authorities are encouraging residents

to home compost with incentives based on discount offers on composting bins and education programmes to help allay the negative perceptions associated with home composting. Some local authorities have introduced certification with their composting education programmes, with an example being the 'Master Composter' scheme adopted by Shropshire Council (Shropshire, 2011) which encourages volunteers to promote home composting in their community.

A popular global marketing tool on waste and used extensively in the 1990s by Government and industry across the globe was the 3'Rs'; Reduce, Reuse, Recycle. This was often symbolised by the 'Mobius Loop' logo, designed by Gary Anderson (Jones, et al 1989), in waste campaign drives. The Möbius Loop is an internationally recognized symbol used to designate recyclable materials. It is composed of three chasing arrows that form a Möbius strip or unending loop (Pickover, 2006).

Figure 1.3 Möbius Loop and Recycle Now logos



The symbol however is used more in Europe and North America than in the UK, and for the UK the 'Recycle Now' symbol is commonly used in national campaigns to encourage recycling of household waste for a variety of materials and includes the Möbius Loop in some of its campaign messages. The Möbius Loop and Recycle Now symbols are illustrated in Figure 1.3 and a link to the Recycle Now website can be found at: <http://www.recyclenow.com>.

Although there is general public support for recycling (Oxford Brookes 1999; Defra 2007a, 2007b, 2008b), surveys have indicated that two thirds of the public are unaware of where waste is disposed of and the actual costs associated with managing this waste (Waste Watch, 1998, 1999; Burnley and Parfitt, 2000, Defra, 2008b, Defra 2009).

The Household Waste Recycling Act, 2003 placed a duty on English local authorities to introduce a scheme which collects at least two types of recyclable waste for every household by 2010. Section 46 of the Environmental Protection Act, 1990 also enables local authorities to place conditions regarding use of receptacles and types of materials collected thereby preventing certain recyclables being disposed of with residual waste, or placing incorrect materials in the recycling container. However very few local authorities have actively sought to enforce recycling schemes with most local authorities instead focusing on encouraging householders to participate through information and education programmes and ensuring schemes are easy to use (WRAP, 2006a, 2010a). Other local authorities have introduced incentive schemes based on rewards for recycling materials which is gaining popularity in the UK. The Waste Policy Review (Defra, 2011) formally recognizes the benefits of Reward schemes and has recently introduced grant funding to support these schemes. However, the success of a local authority recycling programme is very much dependent on public participation and buy-in to the scheme.

An assumption which is commonly made is that what works in one local authority can be applied to a similar sized local authority. This is not always possible due to demographics, population distribution, political agendas and other factors, which make local authorities different (Resource Recovery Forum, 2004). Household recycling schemes also have to take into account the logistics of collection of the waste, sorting of the recycling materials, marketing of the materials and the disposal

of residual waste from the process. Therefore what works for one local authority in terms of waste recycling schemes including collection of different types of recyclable materials, may not necessarily work as well in another. Taking into account the above incentives and barriers to participation in recycling schemes and the need to meet long-term waste objectives and targets, many local authorities are adapting their Municipal Waste Management Strategies to align with local socio-economic conditions (Wilson et al, 2007). This may explain why it is unlikely in the current political climate to provide a single universal recycling system across the UK and why recycling performance varies considerably across local authorities. In this regard obtaining an explanation for a particular scheme's success is difficult without a detailed understanding of the scheme and its characteristics (Noehammer and Byer, 1997).

1.4 Household recycling behaviour

The UK Government Strategy Unit (Strategy Unit, 2002) commissioned a series of research activities into household waste recycling and a national survey by MORI (Ipsos MORI, 2002) identified 58% of householders claiming to recycle. The same survey (Ipsos MORI, 2002) identified up to 15% of householders never recycled. However a survey on household waste recycling conducted by the Environment Agency (Environment Agency, 2002) during the same period identified up to 25% of householders never recycled. Further surveys by MORI (Ipsos MORI, 2005, 2007) and Defra (2007b, 2008b, 2009) suggest the percentage of householders recycling has increased from the 2002 results with 75% of respondents claiming to recycle (Ipsos MORI, 2007, Defra 2009). The 2007 Defra survey identified 71% of respondents claimed to recycle with recycling of paper being the most common household recycled material followed by glass. Barriers to household recycling included "no doorstep collection", "lack of facilities" and "no storage for materials", at 32%, 23% and 17% of respondents respectively.

A survey on public attitudes and behaviours (Defra, 2009) identified 91% of respondents claiming to recycle rather than throwing items away with 56% claiming they “always did this”. Improvement in the percentage of people agreeing to “a duty to recycle” was observed with 95% agreeing in the Defra 2009 survey compared with 81% of participants from the Defra 2007 survey. The trend from the above surveys from 2002 to 2009 suggests a continuing improvement in household recycling behaviour. The above surveys however measure ‘*claimed behaviour*’, which may be subject to over claiming by householders with regard to their recycling activity. Over claiming of recycling activity was identified from previous research (Woollam et al, 2003). One means of checking for over claiming in surveys is to conduct a separate survey (preferably at the same time as the claimed behaviour survey) on participation and to compare the results of this ‘*actual behaviour*’ survey with the claimed behaviour survey results. This approach however has its limitations in that participation surveys tend to measure kerbside recycling and are not very effective in measuring participation at bring banks or other recycling activities.

Examples of approaches to improve recycling participation and to maximise the quantities of materials put out for recycling include conducting a pre-audit of an area as part of the design criteria (McDonald and Oates, 2003), assessment of the socio-economic factors in the area to be served (Emery et al, 2003), and examination of public understanding of the service (Thomas, 2001). However, the above approaches are geared toward predictive studies and identification of barriers to scheme design and are therefore not used to examine determinants of recycling behaviour. In this regard, research into understanding determinants of recycling behaviour would complement scheme design and assist in improving participation in household recycling schemes to move the UK toward achieving national targets for recycling.

For a variety of reasons, local authorities are choosing to vary their collection schemes to meet affordability constraints within their budgets and to encourage waste prevention. An example is the introduction of an alternating weekly collection (AWC) service as a budget-driven measure by the local authority to reduce operating costs and to also encourage householders to increase recycling. The replacement of a weekly residual and recycling collection with an AWC service normally includes the provision of a larger recycling container to encourage the householder to divert more recyclable items from the residual to the recycling container. However, the householder may adopt waste prevention practices instead of recycling, through reusing and reducing all of their waste produced. Although this is not necessarily a bad outcome (waste prevention and reuse involves behaviour at the upper end of the waste hierarchy), the introduction of such service changes, as in the above AWC example, impart a confounding factor in understanding recycling behaviour. Barr et al (2001) however identified that the decision by the householder to prevent and reuse their waste may be due to a number of reasons with different behavioural drivers than that for recycling.

Jackson (2005) proposed that recycling is a consumer-driven activity associated with household management. His report on sustainable consumption behaviour (Jackson, *ibid*) suggested a potential link between theories of pro-environmental consumer behaviour and household recycling activity. Halpern et al (2003) suggested that personal motivation, collective practice, peer pressure, subjective norms and social context were drivers of these activities. Previous research on recycling behaviour identified a number of key determinants or 'antecedents', however criticisms directed at these studies include reliance on self-reported behaviours which may be biased by socially desirable responses (Fisher and Fisher, 1993). Furthermore Davies (2001) suggested, in her review of studies on recycling behaviour, that these studies tended to isolate one or a few independent factors to explain their impact on the dependent behaviour of recycling. This suggests an incomplete picture and

challenges the findings as to whether excluded factors from the study would have an influence on behaviour (combined or otherwise).

1.4.1 Use of behavioural models for environmental issues

Behavioural models may be used for a number of applications which include, as an example, explanatory, exploratory and predictive purposes. The most popular models used in the examination of recycling behaviour include the Theory of Reasoned Action (Ajzen and Fishbein, 1980) and the Theory of Planned Behaviour (Ajzen and Madden, 1986; Ajzen, 1991). These and other models are discussed in the next Chapter. As the aim of this thesis is to examine the determinants of household recycling behaviour, a model which encompasses key determinants associated with household recycling was selected. A key factor in this selection process was weighing the benefits of simplicity against complexity. Complex models aid conceptual understanding but they tend to be limited in their application for empirical quantification. Conversely less complex models aid empirical quantification but fall short of conceptual understanding through their limited use of factors or relationships between factors. The process involved in selecting a suitable behavioural model for investigation of household recycling behaviour for this thesis is covered in Chapter 2.

1.4.2 Approaches to examination of recycling behaviour

There are a number of different approaches to examination of recycling behaviour, these include but are not limited to:

1. Examination of an isolated group of independent and dependent socio-psychological factors to identify behavioural determinants of household recycling.
2. Examination of a comprehensive group of factors as a whole within a multi-attribute behavioural model to provide a complete illustration of the interacting factors that comprise behavioural determinants of household

recycling. This approach looks at how individuals behave in which individuals are considered as proxies representing households.

3. Examination of behaviour in accordance with type or classification through segmenting individuals in accordance with their lifestyle and socio-demographic information. This approach has been used to identify barriers to household waste recycling in which participants were segmented in accordance with their ACORN¹⁰ (A Collection of Residential Neighbourhoods) and other type of categories (WRAP, 2008).

The first approach may provide an opportunity to replicate and verify findings from previous research. However, the examination of a few isolated factors may simply highlight the limitations identified from previous research due to potential key influencing factors being excluded (Davies, 2001) and was eliminated from further consideration. The third approach is concerned with collective behaviour regarding household recycling however, the second approach looks at household recycling behaviour from an individual perspective. With regard to achieving a balance between simplicity and complexity, it was considered by the researcher that a segmentation approach may not work within a modelling environment of individual behaviour and socio-psychological factors. In this regard examination of recycling behaviour based on socio-demographic factors is a concept more associated with the third approach and predictive studies (Perrin, 2002).

Several studies have sought to correlate household recycling behaviour with socio-demographic factors, with a number of these studies being undertaken on entire communities using census information and aggregating individual responses from surveys. These correlations however are at best weak, with the strongest association based on income & education (Vining and Ebreo, 1990; Granzin and Olsen, 1991;

¹⁰ Classification system based on 2001 census data which sorts households into level of affluence categories in 1 is the most affluent and 5 the least affluent

Lansana, 1992; Dersken and Gartrell, 1993; Davies et al, 2002; Martin et al, 2006). It was also found that these correlations weaken over time (Schrum et al, 1995) and other researchers found no significant correlation (Oskamp et al, 1991; Katzev, Blake and Messer, 1993; Gamba and Oskamp, 1994; Boldero, 1995 Barr et al, 2001; Thomas, 2000,). Based on the findings from other research it was decided to exclude the use of segmentation and socio-demographic factors as this thesis seeks to examine determinants of recycling behaviour and approach no 2 was selected.

1.5 Organization of the thesis

Having introduced the scope of this thesis and its main research question in this chapter the following chapters report on the details of this research study as follows:

Chapter 2 places the aims of the research into context and includes a critique of previous research and literature on household waste recycling and review of behavioural models. This identifies the gaps in previous research on recycling behaviour and assisted in the selection of a behavioural model for examining household recycling behaviour.

Chapter 3 provides a review of the research design and method for investigation and analysis of household recycling behaviour. It includes an outline of the research work plan and the phased approach taken for this using the selected behavioural model. This includes the development of the most suitable approach for collecting, collating, analysing and validating data associated with each respective stage of the research.

Chapter 4 provides an introduction to the selected local authority as a 'study area' in which the research was conducted. It also compares the performance of the study area with statistics from other local authorities of similar size and recycling services. This provides a means to identify whether the study area is typical of an English local

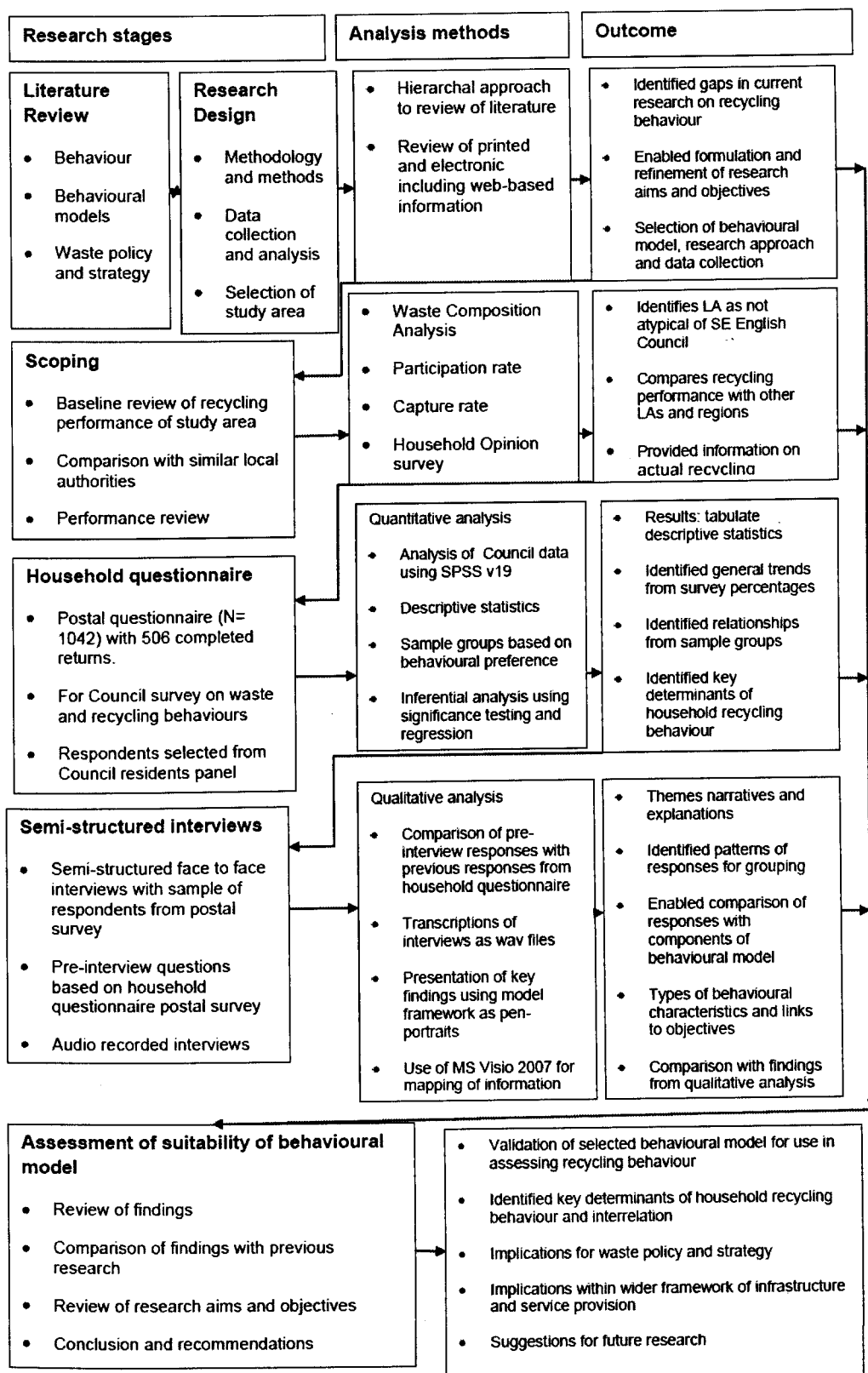
authority and whether the results could be applied to a wider area such as other authorities and with Regions and national trends. In this regard national and regional recycling performance was included in this initial phase of the work programme. This Chapter also includes details of a participation survey representing actual behaviour for comparison with claimed behaviour from a panel of residents. Claimed behaviour at household level was investigated using secondary data from the local authority questionnaire and, primary data from semi-structured interviews conducted with individual householders by the researcher.

Chapters 5, 6 and 7 provide detailed analysis of the information from the work programme for each respective phase, examining behaviour at household level and at the individual level. The data from the surveys and household interviews were analysed using statistical techniques and the results mapped onto the selected behavioural model. This provides an illustration of the results of household recycling behaviour investigation using a mixed-method combination of quantitative and qualitative techniques. The work programme involved analysis of secondary data from Council surveys and primary data obtained by the researcher from an English local authority. By restricting the application of research techniques and methodologies to a single local authority, this provided an opportunity to conduct an in-depth study of household waste recycling attitudes and behaviour.

Chapter 8 places the findings from the research into context and examines the degree to which this thesis addresses the gaps in knowledge and understanding from previous research (this included a comparison with the findings from the study area with that of previous research into recycling behaviour). This effectively seeks to identify whether there is congruency between the findings from the thesis and previous research to support or to challenge current understanding of recycling behaviour. This Chapter also discusses the use of the selected behavioural model in the context of other models, its limitations and its contribution to understanding and

effectiveness. Suggestions for further/future work on investigating household recycling using the selected model, including predictive and exploratory applications, conclude this Chapter and the Thesis. A summary of the research process showing the research stages, analysis methods and outcomes is provided in Figure 1.4.

Figure 1.4 Research process, stages, analysis



CHAPTER TWO: Literature review on recycling behaviour and behavioural models

2.1 Introduction to the chapter

A wide and expanding body of research on behaviour and the environment was identified in reviewing the literature on household recycling behaviour and behavioural models. This information draws upon a wealth of sociological and psychological principles regarding human behaviour. However, in order to focus on the research question there is a need to be selective with the literature reviewed. This literature review therefore focuses on studies associated with household recycling and on models used to examine determinants of behaviour, including household recycling.

Chapter 1 set out the aims of the thesis in terms of household waste recycling, how it is managed by householders and by service providers and how researchers have sought to better understand the behaviour of individuals toward household recycling. This Chapter includes a review of current studies on household recycling behaviour, which was used for the selection of a suitable model for the examination, investigation and analysis of household recycling behaviour. This is designed to develop a better understanding of behavioural determinants in the context of household recycling. This process was set out as follows:

1. To review the current literature on household recycling behavior and to identify gaps in the findings of the studies reviewed
2. To review a selection of models used in the examination of behavior including household recycling behaviour
3. To select from the review a suitable model in which to examine and illustrate determinants of household recycling behaviour

4. To draw conclusions on the literature review including justification for using a modeling approach and model selected to investigate, analyse and illustrate the determinants of household waste recycling behavior.

In order to provide an appreciation of the research question in terms of the processes driving household recycling behaviour, the literature review focused on key topic areas of research, which include:

- ◆ Socio-psychological (attitudes, values, norms, self, habit and routine)
- ◆ Situational factors (logistics, effectiveness, scheme design, education, awareness, barriers)
- ◆ Claimed and observed recycling behaviour;
- ◆ Behavioural models (economic, normative, integrated multi-attribute)

2.2 Household waste management behaviour

The householder plays a crucial role in terms of waste production and the management of the waste in the household including sorting and setting out recyclable materials for collection. Additional behaviours undertaken by the householder include pre-sorting materials and waste prevention and reuse. Waste prevention is at the top of the waste hierarchy, for householders (see Chapter 1). This includes not producing waste in the first place through smart shopping practices or non-acceptance of junk mail as an example. Waste reuse is placed at the next level on the waste hierarchy and involves the householder reusing items that would normally be thrown away, with an example being use of empty jars for storing nails and screws etc. Barr et al (2001) identified that waste prevention and reuse have broadly similar determinants in that they are fundamentally underpinned by environmental value, moral obligation and active concern toward the environment. Research by Barr et al (ibid) included a comparison of household waste prevention and reuse with household recycling behaviour. However, the investigation of waste

prevention and reuse behaviour are beyond the scope of this thesis and from herein, the thesis focuses on behavioural determinants of household waste recycling.

A number of studies (Jackson et al, 1993; Boldero, 1995; Schultz et al, 1995; Fedaku and Kraft, 2002; Sparks and Guthrie, 1998) into household recycling behaviour based their findings on examination of a relatively small number of determinants. An example of the above is from Schultz et al (ibid) who suggested that behaviour is due to several influences operating at varying levels. These influences include social norms, attitudes and situational determinants including convenience. However, the results from Schultz et al (ibid) study were based largely on single variable assessments of household recycling and failed to consider interaction with other determinants. The study by Schultz et al (ibid) also did not take into account the changes in pro-environmental attitudes and increasing demand for better public services. Other studies into the determinants of household recycling behaviour included examination of multiple determinants (Vining and Ebreo, 1990; Thogerson, 1994; Barr et al, 2001; Tonglet et al, 2003; Davis et al, 2006). A number of these studies (Vining and Ebreo, 1990; Ebreo and Vining, 2000; Tonglet et al, 2003) identified many different causal factors or determinants associated with bring site recycling and kerbside recycling for both recyclers and non-recyclers. These determinants included social influence where behaviour is observed by others, knowledge about locally recyclable materials and inconvenience to the individual.

In order therefore to provide greater clarity to this Chapter a selection of behavioural determinants, identified from previous research studies, are considered. These determinants are listed in Table 2.1 with a brief description and are critically reviewed in the following sections.

Table 2.1 Determinants of behaviour

Determinant	Description
Attitude	An individual's disposition about performing a behaviour or, a user's evaluation of the desirability of using a system (Allport, 1935). Includes cognition, affect and behaviour.
Cognition	An individual's positive or negative thoughts and beliefs associated with a particular object or system (Thompson et al, 1995).
Affect	An individual's positive or negative feelings associated with a particular object or system (Thompson et al, 1995).
Value	Individual's preference toward a certain kind of action or state of affairs (Triandis, 1980).
Social Norms	Sets of beliefs regarding what other people are doing or what they approve of doing (Cialdini et al, 1990).
Personal Norm	Self-expectation for behaviour backed by anticipation of self-enhancement or self-deprecation (Schwartz and Fleishman, 1978).
Self-identity	The extent to which performing a specific behaviour is an important component of a person's self-concept (Eagly and Chaiken, 1993).
Social-identity	A set of expectations as to what constitutes role-appropriate behaviour (Tajfel and Turner, 1979).
Agency	An individual's sense that they can carry out an action successfully, and that the action will help bring about the expected outcome (Bandura, 1977; Ajzen, 1991).
Behavioural Intention	A measure of the strength of an individual's intention to perform a specified behaviour (Han, 2003).
Habit	Situation behaviour sequences that occur without self-instruction and have become automatic (Triandis, 1977, 1980; Stern, 2000).
Situational Factors	Objective factors, in the environment, that several observers can agree make an act easy to do (Triandis, 1977, 1980; Stern, 2000).

2.2.1 Review of determinants of household recycling behaviour

The determinants listed in Table 2.1 are predominantly socio-psychological and are both internal to the individual's psyche and external influencing the individual's behaviour. There are also 'external' situational factors influencing an individual's behaviour which include money, time, convenience and transportation. Socio-psychological factors are considered a major influence on recycling behaviour and involve decisions based on personal factors situated in an individual's psyche, and perceptions from others regarding a situation. A review of socio-psychological factors and their relationship to household recycling behaviour where applicable, commencing with attitude, is provided in the following sections.

Attitude

According to Allport (1935) attitudes are hypothetical constructs that cannot be seen or felt, with their existence and their properties inferred indirectly. Furthermore Allport (ibid) suggested that attitude is a tripartite assembly of components some of which are further sub-divided, and that these sub-divided components may also be associated with verbal and non-verbal responses. In this regard attitude is considered to be a) *Cognitive*: comprising an individual or group's thoughts and beliefs; b) *Affective*: representing an individual's feelings and, c) *Conative*: representing an individual's intention to act. Triandis (1977, 1980) proposed that attitude is a layman's term and is not necessary for a rigorous examination of linkages between predisposition to action and behaviour. However, Triandis (ibid) also suggested that when communicating with the public, the term 'attitude' may be used to include affect, perceived consequences, value of consequences and behavioural intention.

Previous research into household recycling suggests that attitude is a major influence on behaviour (Tucker, 2001a, 2001b, 2003). However, it is not clear which

component of attitude has a greater degree of influence on household recycling behaviour i.e., whether the influence is based on an individual's thoughts, beliefs, feelings, etc. Triandis (1971) defined attitude as an idea charged with affect, predisposing action, whereas Ajzen and Fishbein (1977) in their analysis of behavioural intention, attitude and beliefs suggested that behavioural intention depends on the attitude toward the behaviour. Furthermore, they suggested that attitude depends on beliefs about performing the behaviour and the evaluative aspect of each of these beliefs.

Research by Ajzen (2001) suggested that the concept of attitudes being dispositions to evaluate psychological objects is simplistic in that it implies that individuals hold only one attitude toward an object. However Wilson et al (2000) suggested a dual role in which individuals may simultaneously hold two differing attitudes toward the same object in the same context. These attitudes were suggested to be a) implicit based on an evaluative response and b) explicit based on motivation and capacity. Eagly and Chaiken (1993), Van der Pligt et al (1998) and Verplanken et al (1998b) identified from their multi-component view of attitude that an individual's evaluations were influenced by cognition as well as affect and that the affective and cognitive components of attitude may differ in accessibility.

Cognition

Bem's (1970) concept of cognitive attitude proposed that thoughts and beliefs are associated with 'low order' and 'high order' processes respectively. With regard to previous research into behaviour, Johnson and Hasher (1987) proposed that cognitive processes were either automatic or controlled, and that importance to the individual was more likely to be an automatic response. McCarty and Shrum (1994) suggested that importance of recycling to the individual was not a major influence on their household recycling behaviour. They based this suggestion on unconscious processing of information by the individual arising out of personal experience or

parental influence regarding the subject matter. Applying the findings of Johnson and Hasher (ibid) on behaviour and McCarty and Shrum (ibid) on recycling behaviour with Bem's (ibid) overall concept, an individual's attitude regarding the importance of recycling may be regarded as a low-order cognitive process involving unconscious or pre-conscious thought. The findings from the above studies (McCarty and Shrum; Johnson and Hasher) also identified two interpretations of cognitive attitude. The first interpretation is the cognitive process is either controlled or automatic, and the second interpretation is cognitive activity is either a high-order or a low-order process. Based on the above it is proposed that recycling importance could be an automatic low-order cognitive process associated with unconscious thought. However, this does not rule out other cognitive factors which may involve conscious thought.

Ajzen (2001) proposed that attitudes were based on beliefs when non-cognitive factors were involved and that belief drives attitude when other attitude components such as affect are involved. Conscious thought according to Bem (ibid) is however a high-order cognitive process and, according to Ajzen (ibid), belief formed from conscious thought would not be associated with a low-level cognitive process such as importance of household recycling. A different perspective on the role of attitude was suggested by Haddock and Zanna (2000) whose findings identified that the attitude of individuals, who showed high levels of cognitive activity (referred to as '*thinkers*') were predicted by their beliefs regarding an object. Conversely the same study by Haddock and Zanna (ibid) identified that the attitude of individuals who showed lower levels of cognitive activity (referred to as '*feelers*') were predicted by their feelings toward the object. This suggests that individuals differ in their tendency to base their attitudes toward an object or system on either cognition or affect.

Affect

Research by Winkielman et al (1997) examined the subliminal affective primacy process in which Zajonc (1980) assigned precedence to 'affect' over 'cognition' against Schwartz & Clore's (1983) '*feelings –as –information*' (FAI) model. The results from this exercise (Winkielman, *ibid*) were incompatible with the FAI model and concluded that affective priming was unaffected by, and independent of, higher order cognitive processes. This suggests that the generation of feelings toward an object (affective priming) were not affected by beliefs based on conscious thought. Verplanken (1998) suggested that affective and cognitive attitude may also differ in accessibility and that feelings predominate when beliefs and feelings regarding an object were opposite in polarity or 'valence'. Based on this observation by Verplanken (*ibid*), this suggests that if feelings toward recycling were the opposite to that of beliefs toward recycling, then attitude toward the object would predominantly be based on feelings or 'affect'. Ajzen (2001) contributed to these findings and suggested that judgements were not just the result of cognitive processes based on attitude toward the subject matter, but may also be controlled by affective processes. Kempf (1999) identified that the attitudes of individuals toward some objects rely more on affect than cognition, whereas attitudes of the same group of individuals toward other objects rely more on cognition than affect. Therefore, based on Kempf (*ibid*) and Ajzen's (*ibid*) findings, individuals may differ in their reliance on cognition versus affect as determinants of attitude, and cognition and affect may also take on different degrees of importance depending on the subject matter to which the attitude is directed.

Research by Foxall (1983) suggested that the role of attitude in determining recycling behaviour was as a mediating variable. Work by Hines et al (1986) illustrated a positive but moderate relationship exists between attitude and behaviour for household recycling. However, earlier research by Wicker (1969) identified frequently low associations between attitude and behaviour and suggested that overt

behaviour is influenced by a number of other determinants in addition to attitude, which include but are not limited to norms, personality and facilitating conditions. In addition, Wicker (ibid) suggested that other determinants, in combination with attitude, may not necessarily exert the same level of influence for all types of behaviours. This suggestion was later supported from studies regarding pro-environmental attitudes such as energy conservation which exerted little influence on attitudes toward household recycling and in turn, recycling behaviour (Dunlap and Van Liere, 1978; Oskamp et al, 1991; Vining and Ebreo, 1992; Derksen and Gartrell, 1993; Howenstine, 1993; Hallin, 1995; Oskamp, 1995; Shrum et al, 1995). Based on the above findings, a positive attitude toward one topic, such as energy conservation, does not necessarily mean that a similar positive attitude will be held for another topic such as household recycling and vice-versa.

An explanation for the above research findings may be taken from Fishbein and Ajzen (1975) who proposed that the correlation between attitude and behaviour is strongest when they are both measured at the same level of specificity i.e. same topic. In this regard an attitude-behaviour correlation for household recycling would need to be present where attitudes were focussed specifically on household recycling and not on other environmental topics. In other words a strong attitude toward recycling yields a strong recycling behaviour. The attitude-behaviour correlation was however challenged by Hopper and McCarl-Nielsen (1991) and Vining and Ebreo (1992) who identified conflicting findings when seeking to establish a predictor of recycling behaviour with positive attitudes. Work by Schultz et al (1995) and Taylor and Todd (1995) suggested that negative attitudes toward household recycling were more influenced by situational factors (facilitating conditions) including lack of convenience of the recycling service and its perceived ineffectiveness. Guagnano et al (1995) identified a weak correlation of household recycling behaviour with positive attitude towards recycling, which was caveated with the suggestion that the linkage may only operate under certain social contexts.

Gangestad and Snyder (2000) and Vermeir (2009) showed that attitude strength and social pressure influences attitude-behaviour consistency, with high social pressure resulting in more positive attitudes. Vermeir (ibid) also found that strong attitudes did not always correlate with highly consistent behaviours. Berger and Corbin's (1992) study into household recycling suggested that recycling behaviour is moderated by the presence/absence of other more dominant factors in which 'perceived effectiveness' was the most important dominant factor.

Research by Goldenhar and Connell (1993) used a series of constructs for measurement of recycling behaviour including attitudes based on feelings. The aim of this research was to determine if beliefs (from cognitive attitude) of an individual indirectly influenced behaviour or, if an individual's intention to behave directly influenced behaviour. The findings from this research suggested that were that other variables in addition to attitude, such as feedback and perceived behavioural control, which moderated the relationship between intention and behaviour. Perceived behavioural control is one of the factors in Ajzen and Madden's (1986) Theory of Planned Behaviour (TPB) model (which is reviewed later in the Chapter) and may be linked to the findings from Berger & Corbin (1992) regarding perceived consumer effectiveness. Work by Davis et al (2006) and Tonglet et al (2004) identified attitudes; subjective norms and perceived behavioural control as the direct determinants of 'intention' to undertake household recycling behaviour. This moves the attitude-behaviour explanation into an intention-behaviour relationship in which attitude is one of a number of factors that comprise behavioural intention. Several research studies on household recycling have taken the TPB as the starting point with Taylor and Todd (1995) identifying attitudes as the greater predictor of intention to recycle than other factors such as subjective norms in mature schemes.

Concluding the review of attitude there appears to be conflicting opinion from the literature on the role that attitude plays as a determinant of household recycling

behaviour. Firstly, it is not clear whether attitude should be considered as a tripartite arrangement (Allport, 1935) or, whether perceived consequences, evaluation of consequences, affective response and intention to perform a behaviour toward an object or system should be considered as separate determinants of behaviour (Ajzen and Fishbein; 1977 Triandis, 1977). Secondly, it is suggested that behaviour may not follow attitudes if other conflicting factors such as social norms are more dominant and that other factors combine with attitude to influence a particular behaviour for a particular subject matter. It is also not clear how other factors influence behaviour and whether they act synergistically with attitude or separately from attitude.

Values

According to Barr et al (2001) values represent an individual's fundamental underlying orientation toward the environment. Triandis (1977, 1980) referred to value as a preference toward a certain kind of action or state of affairs. Boninger et al (1995) suggested that values are abstract ideals which are not tied to any specific attitude toward an object or situation. With regard to linking attitudes to values it was identified by Johnson and Eagly (1989), the closer the perceived linkage between an attitude and an individual's values, and the more important the values, the more important the attitude is likely. Lydon and Zanna (1990) found that values strengthen commitment to personal projects and regulate the impact of thought on attitude polarization. Boninger et al (1995) in their examination of attitude importance and value relevance established a link between social identification and values. However, not all of the above research examples specifically applied to household recycling.

Applying the above findings on the impact of values to recycling, McCarty and Shrum (1994) identified trade-offs between long-run societal gains and short-run individual needs. They suggested that the long-run attitude position from an individual may be "recycling is important for the good of society", however; the individual may feel it is inconvenient. McCarty and Shrum (ibid) also suggested that positive and negative

attitudes may be influenced by an individual's personal values and value orientations, thereby identifying a mediating role between values and attitudes toward recycling behaviour. This suggests value orientation has an indirect but positive effect on household recycling i.e., the more individuals are collectivistic and co-operative the less likely they may consider recycling inconvenient. Homer and Kahle (1988) identified a relationship between values, attitude and behaviour in which the value orientation of collectivism to influence behavior was mediated via the attitude of the individual based on the level of inconvenience. In addition, Homer and Kahle (ibid) identified that those who valued enjoyment tended to believe recycling was important. With regard to value orientations in terms of individualism, collectivism and locus of control, Balderjahn (1988) suggested that greater perceived ideological control relates positively to attitudes toward ecologically conscious living. Schwegker and Cornwell (1991) demonstrated that internal locus of control was related to a propensity to purchase ecologically packaged products and environmentally responsible behaviour. McCarty and Shrum's (2001) work on locus of control and collectivism suggested a relation between beliefs on recycling inconvenience moderated by the attitude regarding importance of recycling.

Research into correlations between the various types of pro-ecological behaviour has shown mixed results, which are considered to be attributable to different antecedent variables (Cook and Berrenberg, 1981; Granzin and Olsen, 1991; Barr et al, 2001). The work of Tracy and Oskamp (1984) offered an explanation for the different degrees of association in which fifteen (15) different environmental behaviours were examined with similar behaviours on a group basis. Berger (1997) identified strong values associated with the recycling of paper, glass and cans. In addition Berger (ibid) identified that composting values gave a strong correlation with recycling and purchase of recycled paper. Weaker value associations were however encountered between other practices such as water and energy conservation.

The above studies support the inference that both personal values and value orientations are related to attitudes as a mediator of behaviour. Furthermore both attitudes in terms of thoughts and beliefs, and values are cognitive processes and subject to influence by behaviour (Festinger; 1957; Bem 1972; Thogerson 1999; Thogerson and Olander, 2002, 2003). However, other factors such as social norms and knowledge were not examined in these studies, which are now considered in the following section.

Social Norms and Sociality

Social norms help guide human behaviour and provide a target for interventions (Schultz, 1998, Schultz et al, 2007). Ajzen and Fishbein (1980) defined social norms as 'subjective norms' which are an individual's perception that most people who are important to them think they should or should not perform the behaviour in question. This added an important distinction between two types of social norms 'descriptive' (visible behaviour of others) and 'injunctive' (socially shared rule of conduct). Research by Aarts and Dijksterhuis, (2003) into the influence of social norms within a social group situation identified the following points:

- a. Social norms may be internally or externally derived by the social group with the latter operating on a wider scale and introduced to the group from outside. The former are those norms developed by the social group members as a result of the groups internal functioning.
- b. Social group norms serve a variety of functions for individual members and the social group in isolation and, for individuals and the social group collectively. Individual functions include guidance of what is expected from the individual by the social group and, what is considered acceptable behaviour of the individual by the social group. Social group functions provide a means of co-ordination and control, with norms acting as markers of identity for both social group and individuals.

In accordance with Cialdini et al (1990), descriptive norms are based on what individuals perceive as normal in a situation such as putting out recycling for collection if everyone else does the same. Cialdini et al (ibid) suggested that cognitive effort in performing an activity could be bypassed by simply copying the actions or behaviour of others, suggesting a reliance on descriptive social norms in playing an adaptive/effective role in behaviour. Prescriptive social norms (Reno et al, 1993; Cialdini and Goldstein, 2004) however espouse moral rules and guidelines for the social group and their role is therefore to motivate and constrain actions through social advantages and disadvantages respectively. Social norms according to Cialdini et al (1991) also operate in two distinct ways when applied to the same situation. Firstly, social norms may operate indirectly in an heuristic¹¹ manner to influence individual behaviour without requiring too much cognitive effort. Conversely social norms may operate directly on influencing social outcomes associated with a given behaviour. In exploring how individuals respond to normative influences, Cialdini et al (1991) suggested that this was dependent on a number of factors. These factors included the context or situation of the social group, the importance of action by the group, the state of the environment, and circumstances accompanying the situation. The response to a descriptive or to a prescriptive social norm therefore depends on the salience or relevance of the social norm for the individual. In other words individuals who are dispositionally (as opposed to situationally) focused on normative considerations are more likely to act in norm consistent ways (Cialdini et al 1991, 2004).

Normative theories however may transcend the individualistic approach by focusing on social influence or '*sociality*' as the key factor in individual behaviour. Jackson (2005) suggested that sociality was evident from daily interactions of individuals who

¹¹ Mental short-cut to understand the factors influencing behaviour and how they interrelate (Jackson, 2005; Halpern, 2006)

tend to be influenced by descriptive social norms observed from the behaviour of others. However, no similar influence was observed from the prescriptive social norms of the social group. This suggests that individuals may be influenced by what is happening in the social environment (e.g. community recycling), however, they may not readily subscribe to the moral rules of the social group. In this regard influence on the individual may be more associated with the social acceptability of the behaviour itself, than that from the moral expectations of the social group.

Vining and Ebreo (1990), Oskamp et al (1994) and Sadalla and Krull (1995) identified an influence from family and friends (sometimes termed social diffusion) which resulted in an increased participation in household recycling. This may include other similar close relationships e.g. neighbours who would fall into this category. Jackson et al (1993) suggested that social influences are assumed to have a role in creating and reinforcing social norms and the individual's values with respect to household recycling behaviour. Their findings suggested that messages and social influence acted as stimulators of recycling behaviour, which operated through different modes. These social influences operated through an individual's personal value system providing a bearing on the pros and cons of recycling which influence the individual's assessment of the importance of recycling.

Research by Vermeir (2009), on social pressure placed on household's recycling, obtained from self-monitoring of participation in recycling schemes, showed that attitude-strength and social pressure were a major factor in influencing behaviour. This study identified that individuals who exhibited a less positive attitude to household recycling tended to exhibit a positive stance to household recycling only when they were subjected to social pressure. Conversely, individuals with strong attitudes to household recycling engaged in recycling activities even in the absence of social pressure. The findings from Vermeir's (ibid) research suggested that strong

attitudes are a good predictor of attitude-behaviour consistency regardless of the perception of control when the individual is subjected to social pressure.

Barr et al's (2003) research on kerbside recycling participation found that the presence of social norms were an important criteria, where the visual indication of non-participation in recycling is high. They identified that if the recyclable items set out for collection were visible to others then this prevented people recycling certain items such as drinks bottles and cans due to potential negative social perceptions from others.

Conversely, research by Tonglet et al (2004) and Goldenhar and Connell (1993) identified when there is low behavioural visibility such as that associated with recycling at 'bring-sites' and multi-family apartment blocks, the influence of social norms is less significant and all recyclable items were disposed of. An explanation for the above observations by Tonglet et al (ibid) is the materials which are recycled cannot either be directly associated with an individual or the household or, the contents of the recycling container are not openly visible. Therefore the activity of recycling by an individual through use of bring banks, communal containers and to an extent wheeled bins, may have little or no social implications to the individual based on the perceptions of others. This is different to the perceptions associated with kerbside recycling where materials are openly visible when placed in a recycling box and not a wheeled bin.

Normative influence was found to operate successfully when behavioural visibility was high. Salimando (1987) found that the popularity of recycling among neighbourhoods was dependent on a significant number of households putting out recyclables to encourage non-recyclers to participate. Salimando (ibid) suggested that when a point is reached where everyone participates in the recycling scheme then people become embarrassed not to recycle. This may be related to pressure to

conform to a group norm or '*public conformity*' (Asch, 1951, 1955) as the neighbourhood or community needed to establish a 'critical mass' of recyclers to win over non-recyclers.

Community or social group influence can also play a major part in household recycling behaviour. Nielsen and Ellington (1983) identified an almost double participation rate in a weekly kerbside collection scheme where a block leader (person within the community of influence) was involved. Oskamp et al (1994) however, challenged these findings and suggested that the 'community leader' strategy may not always work. The argument behind this was interventions aimed to change social norms failed to consider community characteristics and that residents who perceived themselves as part of the community or social group may be more affected by the actual intervention exercise than the aims of the intervention itself. This has parallels with the Hawthorne effect (Roethlisberger et al, 1939; Franke and Kaul, 1958; Landsberger, 1958) based on an artificial increase in performance where the subject audience are aware they are being observed and the purpose of this observation.

Schultz et al (1995) further suggested that location plays a part in social influence and that rural residents may be more influenced by social norms to recycle than urban dwellers and that the same principle applies to homeowners over renters. In this regard they proposed that successful use of social pressure to induce recycling may be largely contingent upon the extent to which residents see themselves as part of the community. Tonglet et al (2003) identified the emergence of a new factor: 'community concern'. They suggested that this factor comprised two variables, which were 'concern with maintaining a good place to live' and, 'interest in community health and well-being'. It appears from the observations from previous research that concern with the community and corresponding role are key factors in shaping social norms operating within the community, but is not restricted to rural areas as in

Schultz et al (1995). Furthermore those who have a strong positive perceived role in the community are more likely to participate in positive social community activities such as recycling.

Concluding this section, social norms are likely to be a major determinant of household recycling behaviour and should be considered with other factors such as attitude and values. However, other factors such as personal norms, social identity and facilitating conditions may also play an important role in influencing household recycling behaviour and are discussed in the following sections.

Personal Norms

Schwartz and Fleishman (1978) defined personal norms as “self expectations for behaviour backed by the anticipation of self-enhancement or self-deprecation”. In this regard, personal norms differ from social norms in that they refer to internalized self-expectations, whereas social norms are externalised based on the behaviour of significant others’ perceived expectations (Schultz et al, 1998). They argued that the formation of personal norms arising from influence by the group social norm would only occur when the individual is a) aware of the consequences of their actions and b) a personal responsibility is ascribed to these consequences. This suggests that for an individual to adopt a personal norm for recycling, the individual needs to possess a basic knowledge and rationale for recycling. In addition, the individual needs to personally believe that their contribution (recycling) is effective and that their non-contribution would have negative consequences for themselves and/or others. This personal responsibility may be reduced when others are not seen to be recycling (Weyant, 1986).

Jackson et al (1993) suggested a person’s voluntary recycling behaviour was largely determined by how important an individual considers recycling to contribute to their own and/or society’s well being. This was suggested to be due to conscious

comparison of the benefits and costs (personal and societal) associated with recycling. The outcome from this was a reflection of the person's values and internalized norms of appropriate behaviour. Schultz et al (1998) identified in their evaluation of intervention strategies in La Verne California, a combination of personal and social normative influences to recycling participation. They postulated that because recycling is a socially desirable behaviour, the provision of information in the form of feedback on their personal recycling performance may activate personal norms. Anecdotal evidence was found from responses from participants from this study including statements such as "You make me feel guilty for not participating". However group feedback which provided information on the recycling performance of their neighbours' was suggested to trigger not only individual personal norms but also the creation of a group social norm.

Schultz et al (1998) also found that personal norms were activated more readily than social norms as the intervention strategy was activating a personal recycling norm that already existed. This suggests the process of internalizing and acting on a new group social norm may take longer than the activation of a personal norm. De Young (1986, 1989) argued that participating in environmental behaviour engendered a feeling of satisfaction that yielded both an inner sense of well being alongside a belief that society is benefitting from that behaviour.

Schultz et al (1998) looked at the relationship between personal and social norms for household recycling and composting. They found that in their research that personal norms once formed were not influenced either way by the group social norms. No significant relationship was found between beliefs in personal efficacy or the effectiveness of household recycling effectiveness (Oskamp et al 1991). However, Gamba and Oskamp (1994) found stronger beliefs in recyclers regarding the effectiveness of recycling programmes but no differentiation in personal perceived effectiveness. Strong personal beliefs on the benefits of recycling were observed by

Vining and Ebreo (1992) and by Schultz et al (1998), Granzin and Olsen (1991) and Ellen (1994) on the effectiveness of personal beliefs regarding household recycling for internalising responsibility for action by individuals. The above trends towards Schwartz's factors show strong correlation among recyclers; however, when it came to validating the proposed causal linkages to behaviour the results were equivocal (Tucker, 2001a).

From a review of the literature there appears to be a linkage between personal norms and group social norms with regard to recycling behaviour and the nature of the activity. This includes whether the recycling behaviour involves kerbside or using bring banks or other means. Kerbside recycling appears to be socially driven based on the perceptions of others, which may be influenced by the moral code (prescriptive norm) to recycle or that concerned with socially responsible behaviour not necessarily directly connected with recycling.

Altruism

Selflessness or altruism is suggested to be synonymous with recycling where personal effort for example based on physically sorting materials or taking materials to bring sites, or cost in terms of financial or personal time, is borne to provide overall benefit to society (Nielsen and Ellington, 1983). This altruism model is also consistent with the work of De Young (1986) who observed intrinsic motivation was the most important reason for recycling. This does not mean that everyone who recycles is being altruistic. In this regard, the altruistic statement "recycling is the right thing to do" would be considered as more of a personal norm or 'private conformity' in which there is a highly internalised moral attitude governing the individual's behaviour (Asch, 1951, 1955) which is related to their personal values. This is particularly evident from the findings of Cummings (1977) who found that many users of bring sites cited reasons for participation were based on altruistic and on moral grounds.

Schwartz's (1977) Model of Altruistic Behaviour (MAB) connected the sense of moral obligation to altruistic behaviours. He proposed that these actions were more likely to occur when moral (personal) norms were activated. This gave rise to the theory that personal norms were activated when the two conditions 'Awareness of Consequences' (AC) and 'Ascription of Responsibility' (AR) were satisfied. Vining and Ebreo (1992) suggested that the Schwartz model could be used to explain recycling behaviour as it could be 'indirectly' governed by social norms, and 'directly' influenced by personal moral norms. Therefore those who feel morally obligated to recycle would do so if they believed that recycling had positive consequences (AC) and whether they felt personally responsible for those consequences (AR). Stern et al (1993) sought to link the Schwartz norm-activation theory with the New Environmental Paradigm (Dunlap and van Liere, 1978). This exercise resulted in the creation of a model that incorporated the three value orientations of the NEP. The results from this exercise were however preliminary and the authors concluded that further empirical work was required to improve the measurement of beliefs and value orientations to provide a broader social-psychological theory based model. To date there is no evidence, to the best of the researcher's knowledge, of further studies being conducted, following Stern et al's (ibid) work.

Altruism however, cannot be fully decoupled from other motivational factors and is often founded on strong environmental values (Dunlap and van Liere, 1978; Hopper and McCarl-Nielsen, 1991; Stern et al, 1993). Investigative work by Vining & Ebreo (1992) into whether determinants to altruistic behaviour reside within the individual suggested that people who recycle exhibited a greater endorsement of their personal norms than that of their non-recycling counterparts.

Self-identity and social-identity

The role of self-identity and social-identity is an important factor in shaping individual's motivation to behave in a certain manner. The manner in which individuals consider themselves is also critical in influencing how they will actually behave. In testing self-identity with the consumption of organic food, Sparks and Shepherd (1992) identified a significant influence on intention over and above the influence from attitude. The study identified self-identity¹² as a continually distinctive predictor of intention to recycle, which complemented the influence of attitude and other factors, such as personal values and norms. Stryker (1986) and Stryker and Burke (2000) concluded that the self is a collection of identities that reflect the roles a person occupies in the social structure. These roles foster habitual action that contributes to role fulfilment and self-validation. This relates to research by Andersen and Chen (2002) who proposed an interpersonal social-cognitive theory of the self and personality, which includes the 'relational self' in which knowledge regarding the self is linked with knowledge about significant others. They found from this research that the profound relevance of significant others to peoples' emotional and motivational lives paved the way for linkages between significant others and the self. This resulted in a set of unique relational selves with each set having specific patterns associated with a significant other.

Studies into the impact of self-identity by Terry et al (1999) and Manetti et al (2004) on recycling intention, observed a combined effect of self-identity and social identity. Terry et al (ibid) examined the effects of self-identity as a function of repeated experience of performing an activity such as household recycling. This study observed an individual's behaviour which was performed repeatedly and thus under habitual control. They suggested from this exercise that decisions to engage in similar recycling behaviour would depend more on the importance of the behaviour

¹² The extent to which performing a behaviour is an important component of the persons self-concept (from Eagly and Chaiken, 1993)

for the individual's self-identity than that of the perceived expectations of significant others (Charng et al, 1988). This is contrary to judgements and feelings regarding the behaviour in terms of attitude or the perceived expectations of others based on group social norms. The above findings from Terry et al. (1999) suggest that when recycling behaviour becomes automatic, the role of cognitive determinants such as attitude in influencing the behaviour should diminish, whereas the influence from self-identity would strengthen. This is due to the repeated performing of the behaviour increasing both the likelihood that the behaviour is an important component of self-identity and, the individual's motivation to validate their status as a role member. Recent research by Nigbur et al (2010) on a kerbside recycling programme in Guildford, found that self-identity was influential on intention to behave and contributes to behaviour.

With regard to the linkage between self-identity and social identity theory (Tajfel and Turner, 1986), an important component of the 'self' was derived from membership of the individual in social groups and categories. This was illustrated in terms of a continuum between personal identity and social identity in which the direction of travel along the continuum determined the extent to which social group related or personal characteristics influence an individual's behaviour (Tajfel and Turner, 1979). Therefore, if the individual's behaviour was in accord with the norms of a relevant social group, then the individual is likely to engage in a particular behaviour in accordance with that of the social group (Terry and Hogg, 1996; Terry et al, 1999; Manetti et al, 2004). Conversely, if the social group membership is not salient to the individual then the corresponding behaviour would be in accordance with the individual's personal and idiosyncratic characteristics (norms and values) rather than the norms of the social group.

Cognitive dissonance and spill over

Festinger's (1957) Cognitive Dissonance Theory postulated that internal feelings of discomfort are experienced by an individual as a motivator for reducing inconsistencies in the cognitive information held on themselves, their behaviour or their environment. These feelings can be generated from a conflict generated between an individual's attitude or values and the subsequent behaviour expected of the individual, which is contrary to their attitude. They may also be invoked from discrepancies between attitudes concerning different objects or themselves, and between attitudes and expected behaviours. Thogerson (1999) demonstrated this phenomenon through the effects experienced between one kind of environmental behaviour and another. An example of this is when positive attitude toward household recycling by an individual is inconsistent with negative attitude toward organic food. Thogerson's (ibid) research identified emotional discomfort and a change in attitude by the individual toward favouring organic food.

A shift in attitude toward other behaviour is termed '*spill over*' and when a positive attitude leads to another positive behaviour this is termed '*positive spill over*'.

Negative spill over is the converse of this relation with an example being shifting attitudes toward non-recycling due to conflicts with more dominant attitudes. The spill over effect may be due to cognitive dissonance however it may also occur as a result of other factors. Bem's (1972) theory of self-perception complements Festinger's cognitive dissonance theory, where personal attitudes are inferred on the basis of self-behaviour, in a similar manner as attitudes regarding others are inferred. In this regard individuals who have positive attitudes toward other environmental activities may be influenced to adopt similar attitudes toward recycling or changes in recycling programmes.

Agency

Agency is broadly defined as an individual's sense that they can carry out an action successfully and that their action will help achieve an expected outcome. Self-efficacy (Bandura, 1977) is widely used to describe the concept of agency and is a major component of Perceived Behavioural Control (PBC) as defined by Ajzen and Madden (1986). PBC focuses on the level of effort individuals are willing to exert to perform a behavior and is considered an important determinant in behavioural influence. In fact, Ajzen (1991), suggested that PBC together with behavioural intention could be used directly to predict behavioural achievement. This claim was based on two rationales. Firstly, he argued that the degree of success in carrying out an intention depends on the strength of belief in ability to carry out a behaviour. Secondly, PBC can be taken as an indicator of actual control over an intended behaviour. In this regard if an individual has volitional control over their actions then their intention is likely to closely correlate with their behaviours. Most studies assessed PBC as a direct measure; however this depends on the individual's willingness to articulate their control perceptions (Davies et al, 2002). To address this issue Davies et al (ibid) in their research used a dual approach for PBC in which both direct measurement and a belief based measure was used. The belief based measure involved obtaining respondents beliefs about salient control factors including the perceived presence/absence of resources, opportunities and barriers that may impede or facilitate performing of behaviours.

Research into household recycling and composting by Taylor and Todd (1995) included PBC in their model, which comprised 3 components. These components of PBC according to Taylor and Todd (ibid) included facilitating conditions (Triandis, 1980), self-efficacy (Bandura, 1977) and compatibility¹³ (Rogers, 1983). They found that for both recycling and composting, self-efficacy and facilitating conditions were

¹³ Degree to which the activity fits with an individual's values, lifestyle, needs and previous experience.

positively related to PBC but compatibility was not. This may be attributable to recycling not being compatible with peoples' routines and lifestyle. However, despite negative compatibility this did not lessen the overall PBC from the participants. Research by Tonglet et al (2003) identified PBC and situational factors (facilitating conditions) did not contribute significantly to the explanation of intentions and behaviour regarding recycling of household waste. These findings which are supported by research by Boldero (1995) and Davies et al, (2002), were suggested to be due to the study area Brixworth, UK, having an established kerbside collection service for recycling, so control may not be considered an issue by the participants. In addition, the majority of the participants in the Brixworth study, (Tonglet et al, 2003) were knowledgeable in that they knew how to use the household recycling service. These findings were reproduced for PBC by Davis et al (2006) in an area which had a newly introduced kerbside recycling service.

Comparing the findings of the Taylor and Todd (1995) study with that of the Tonglet (2003) and Davis et al (2006) studies, PBC appears to become less important as household recycling becomes easier to do and is more in tune with people's daily routines. Intention to behave also appears to be an intermediate step in household recycling before actual behaviour with previous studies suggesting that behavioural intention appears to be shaped by social norms, personal norms, attitudes, values, self-identity and agency.

Behavioural intention

Behavioural intention is defined as a person's subjective probability that he/she will perform some behavior (Fishbein and Ajzen, 1975: 288) and according to Triandis (1980: pp. 203) intentions are self-instructions by individuals to behave in certain ways. Intention in this regard represents an individual's future plans to carry out an activity or behaviour. In defining attitude, Triandis (1971) suggested it is an imprecise all-inclusive term, but nevertheless useful for discussions that do not need to specify

whether discussion is on behavioural intention, affect toward the behaviour, evaluation of consequences or perceived consequences of an act. Triandis (1980) suggested the probability of an act's occurrence is the function of the sum of habit plus behavioural intention moderated by physiological arousal and facilitating conditions.

With regard to behavioural intention, Triandis (ibid) proposed that this is a function of social factors, affect toward the behaviour and the value of the perceived consequences of the behaviour. The section on attitude in this Chapter identified a tri-component relationship defining attitude in which intention to behave is part of the attitude function. However, according to Triandis (1971), if attitude is a layperson's term, then behavioural intention is the output of affect, perceived consequences, evaluation of consequences and social factors. In this regard attitude is an encompassing term to define the cognitive-evaluative and emotive aspects of intention. Based on the above findings by Triandis (1971, 1980) and by other research studies (Ouellete and Wood, 1998; Davies et al, 2002; Tonglet et al, 2003; Nigbur et al, 2010) behavioural intention is not a single factor but a combination of factors. Behavioural intention would therefore not be treated in isolation from other behavioural determinants and omission of certain factors, which comprise behavioural intention, may result in an inadequate picture of this determinant. However, behavioural intention is not always the main influence on behaviour. An example of this is from Conner and Armitage (1998) who in examining the intention-behaviour relationship, identified that intentions accounted for less than 40% of the variance in behavior.

Davies et al (2002), in reviewing the relationship between behaviour and intention suggested that unless behaviour is mandatory there is always a choice to be made. In this regard they suggested that an over-reliance on intention as an expression of commitment to participate in a kerbside recycling scheme would be a serious error.

Their research supported the work by Foxall (1997a; 1997b) where the attitude-intention-behaviour pathway restricts the domain to alleged mental determinants rather than the behaviour itself. Davies et al (ibid) based on their findings recommended equal emphasis on evaluation of choice made by the individual as to that in measuring the cognitive and situational influences on the behaviour. Therefore if individuals give more consideration to behavioural alternatives then it is likely their responses would be more reliable (Davies et al (2002).

Habit & Routine

Past practice is also an important element in strengthening recycling behaviours. During her research on household recycling of newspapers, Boldero (1995) found that past behaviour was the only significant predictor of both intention to recycle and actual behaviour. Triandis (1977) assumed that behaviour that has never occurred in the history of the individual was under the control of behavioural intention. Conversely, Landis et al (1978) suggested the relative impact of habit was a more potent predictor of behaviour than intention, implying behavioural intention plays less of a role in determining behaviour than habit. The above research findings suggest that when intention to perform an activity becomes important to the individual, the habit factor is suppressed subconsciously by the individual. This is due to automatic behaviour being replaced by cognitive activity such as thought. Conversely, as a particular behaviour repeatedly occurs, the importance of the habit factor increases, while behavioural intention decreases.

Research by Knussen and Yule (2008) suggested that a lack of recycling habit could actually be an indication of an alternative habit in which recyclables were disposed in the residual stream by the householder. Knussen and Yule (ibid) also suggested that those individuals who recycled most of their waste in the past were more associated with attitude toward the activity than a habit from repeatedly performing the behaviour. In this regard they found it was the non-recycling individuals who were

displaying habitual behaviour. In addition, they also found that lack of recycling habit as a reason for past failure to recycle was independent of any effects of situational constraint, demographic variables, attitude, norms and perceived behavioural control. This concurred with the findings from other research (Ouellette and Wood, 1998; Terry et al, 1999; Tonglet et al, 2004) that past behaviour based on experience of a scheme does not necessarily result in a behaviour becoming a habit.

Verplanken, et al (1998b) described habits as “learned, goal-directed acts that become automatic responses in specific situations”. This suggests that the act of recycling is performed without full conscious reasoning. However, many behaviours such as recycling involve more than one action (bottle washing, storage, set-out) and may involve a series of separate processes which may not be habitual. Previous research on the role of habit identified a difficulty in measurement (Eagly and Chaiken, 1993; Verplanken, 2006) which is compounded where more than one step of action is required. In this regard based on previous research findings it may be argued that frequent disposal of rubbish by the individual via the household bin is an automatic act and therefore habitual. However, as the activity of household recycling involves multiple steps, according to Knussen and Yule (2008) there would need to be an initial cognitive consideration of each respective step associated with recycling. Furthermore each respective step may be triggered by different stimuli or automatic activation of cognitive factors and social norms as suggested by Ajzen, (2002) and Verplanken (2006).

Previous research suggests that habit does play a major role in determining household waste management behaviour however the formation of a habit may not necessarily be influenced by previous experience. However, as performing an activity such as separation of waste for recycling becomes more automatic and less under direct cognitive influence, and then it may be argued that the behaviour is directly influenced by habit, which bypasses behavioural intention. This is almost

certainly the case with disposal of household rubbish; however, due to the multiple steps associated with household recycling, behavioural intention may initially be the main driver of behaviour. This would logically continue until the activity becomes a routine and habit becomes the main driver of recycling behaviour.

2.2.2 Situational factors of household waste recycling

Situational factors represent an individual's situation at a given time and are of considerable importance in shaping their intention and/or behaviour toward household waste recycling. These factors include spatial elements, such as access to services (Vining and Ebreo, 1990; Derksen and Gartell, 1993; Guagano et al, 1995, Barr and Gilg, 2006), and contextual based on type of container provided, collection regime frequency, convenience of collection, logistics, types of materials collected (Ipsos MORI, 2005; Barr and Gilg, 2006; Williams and Timlett, 2006, Timlett and Williams, 2008). In addition, scheme promotion may act as barriers or 'disablers' to participation by the household in the recycling scheme (Noehammer and Byer, 1997, Price, 2001; Scott and Watson, 2007). Other situational factors include general and specific knowledge regarding the environment and waste education and actual experience/history of the scheme.

Household recycling schemes contain a number of design variables that can be aimed at removing barriers to participation such as inconvenience, poor service, and programme costs. These factors play an important role in determining levels of behaviour and provide a mechanism to evaluate and improve the process of interaction through expansion of services offered. These factors and their influence on recycling behaviour are discussed in the following sections

Logistics and Convenience Factors

Logistics include lack of storage and space for recyclables (Vining and Ebreo, 1990, 1992, 2001; Gamba and Oskamp, 1994; Boldero, 1995, Williams and Timlett, 2006),

lack of time to recycle (Vining and Ebreo, 1990; Lansana, 1993; Gamba and Oskamp, 1994; Barr and Gilg, 2003; Williams and Timlett, 2006). This influences the degree of convenience perceived by the individual from the recycling scheme (Tucker, 1998, Barr et al, 2001, 2003, 2006). Thomas (1990), based on a survey in London Riverside, identified a dislike of a blue-box recycling programme by residents. The reasons stated by respondents for the dislike of the blue box included logistical factors including no box-lids (23%), boxes too small (19%) and lack of storage space for containers and materials (5%). This translates into a general perception of the service being inconvenient and resulted in 17% of respondents stating that it was "too much bother to use the programme". Vining and Ebreo (1990) found that people whose perception of recycling is inconvenient tended to recycle less than others who did not experience this difficulty. Boldero (1995); McDonald and Oates (2003); Martin et al (2006) suggested that public perception regarding inadequacy of local authority recycling facilities may also affect participation rates and that householders that justify their non-participation in recycling schemes often used this reason.

Pieters (1991) identified a change in kerbside collection frequencies of organics from weekly to fortnightly as having a negative impact on recycling programmes.

Provision of free or additional containers to householders assisted in increasing participation in kerbside schemes (Jacobs et al, 1984; Everett, 1994; Guagano et al, 1995). Everett (1994) argued that making recycling participation more convenient reduces people's personal costs in terms of effort involved in sorting and travel to the recycling facility. Therefore if the recycling box was provided free of charge and collected alongside their residual household waste, people were more likely to participate. Regarding bring banks, Ball and Lawson (1990) suggested that the location of recycling containers was an important factor in increasing usage of the bring site and that recycling banks at supermarket car parks were considered inconvenient for non-recyclers.

Research by Ball and Lawson (1990), Katzev et al (1993), Jones and Porteous (1996), and Barr et al (2001) all suggested that poor condition of recycling facilities such as bring banks discouraged use. This was particularly evident if the facilities were littered, dirty, covered in graffiti or inadequately lit. Shrum et al (1995) and Martin et al (2006) suggested that a critical threshold based on level of inconvenience needed to be overcome in order for households to participate in the recycling scheme. Guagano et al (1995) suggested that attitude and inconvenience were key factors in recycling scheme participation. If convenience to participate in the recycling scheme was highly negative, large changes in attitude were required to induce positive recycling behaviours with the converse for small negative convenience values (Domina and Koch, 2002; Sidique et al, 2010).

Efficiency & effectiveness of kerbside collection schemes

There is a wide and expanding area of literature regarding design features and efficacy of kerbside collection schemes (Thomas, 2001; Tucker, 2003; Martin et al, 2006; Timlett and Williams, 2008; Sidique et al, 2010, Timlett and Williams, 2011).

There are also a number of indicators that are used to demonstrate the overall effectiveness of a recycling scheme. However, although household waste composition and participation surveys measure actual behaviour, they do not identify the behavioural drivers associated with household waste recycling.

In researching claimed behaviour based on public attitudes for participation and non-participation in Milton Keynes and Hampshire County, Thomas (2001) looked at effectiveness and levels of understanding of kerbside recycling schemes. The results from Milton Keynes showed a reasonable diversion rate of 18% (1998/99) could be obtained through setting a high potential diversion yield with a low recovery or recognition rate. A relatively low capture rate (52%) of some materials was obtained at a good participation rate (65%). This suggests that there is either a lack of

understanding by householders in using the recycling scheme or there is poor motivation resulting in low quantities of material being recycled by householders. This potential impact from poor motivation was examined through analysis of attitudinal outcomes and the level of understanding of scheme operation.

The results from this exercise also showed overall good motivation based on altruistic beliefs and values with a lower awareness of scheme requirements. The inference that lack of understanding over motivation was the reason for low capture rates was reinforced by the fact that participation rates were relatively good, which would not be expected with low motivation. From this exercise, it was suggested scheme effectiveness could be improved through improving participants understanding of scheme requirements and through reduction in the range of targeted recyclables. However, in order to improve recycling schemes there will need to be both a collection of a wide range of materials with a good capture rate. This issue was addressed by looking at public understanding of household waste recycling, and participation in schemes with different design parameters and communication strategies (Thomas, 2001) and the impacts from the combined effects of infrastructure provision, service satisfaction and resultant behaviour (Timlett and Williams, 2011)..

Recycling scheme design and operation

A review of previous research on recycling scheme design and operation (Perrin and Barton, 2001; McDonald and Oates, 2003; Martin et al, 2006; Timlett and Williams, 2008; Sidique et al, 2010) concludes that this is a critical factor in encouraging householders to participate and recycle more materials. Scheme design involves a variety of elements, such as container provision, collection frequency, pre-sorting by householder, types of materials collected etc. which impart an influence on household recycling behaviour. A report on the barriers to recycling at home (WRAP, 2008) and selection of recycling system (WRAP, 2009) identified key areas for more

effective scheme design and areas for improvement regarding communications and promotion at the local level.

Thomas (2001) showed that households with container systems for recycling waste materials performed better than those households with no containers for recycling waste materials. However, no distinct correlation between container type and level of understanding was identified. Greater awareness of the scheme was demonstrated from those areas which were issued with twin wheeled bins. A major factor in reducing inconvenience is the provision of a free container for recycling (Everett and Pierce, 1992; Noehammer and Byer, 1997; Tucker et al, 1998; McDonald and Oates, 2003; Martin et al, 2006). Conversely, removal of a container has resulted in 50% reduction in participation (Ball and Tavatian, 1992) and lack of container provision was demonstrated as a primary reason for poor participation (Miller Associates, 1999). According to research by Martin et al (2006) mandatory recycling schemes generally achieve higher participation rates than voluntary ones. However Jenkins et al (2003) found no difference between voluntary schemes compared with mandatory schemes in the U.S .The recycling schemes in the UK are all voluntary on behalf of residents participation, however certain local authorities such as Barnet LBC and Exeter City Council introduced penalties on residents for placing recyclable items in their refuse bins or the wrong materials in the recycling container. This situation has since changed by the U.K. Coalition Government with the Introduction of the Localism Act 2011 (formerly Localism Bill) and instruction to local authorities to cease the levying of penalties to residents for recycling incorrect materials in their container.

Frequency of collection also was not found to impact on level of understanding with high and low performances identified from each group (Thomas, 2001; Tucker and Spiers, 2002; Timlett and Williams, 2008). However, although changing to a less-frequent collection service may result in strong public opposition and potential non-

participation; this is frequently not the case and may be in fact a representation of the intention to not participate, which is different to actual non-participation.

Everett (1994) suggested that increasing the variety of materials collected for kerbside recycling decreased participation rates, particularly where householders are requested to pre-sort materials prior to collection. An example of this is provided by Pieters (1989) in which the early collapse of a Dutch kerbside programme was attributed to the requirement of householders separating their waste into four fractions. This may have been the situation during the late 1980s and early 1990s where recycling was not fully embedded into regular household waste management practice. However, research by Thomas (2001) suggests that increase in the range of materials collected for recycling may result in lower diversion of materials due to increased scheme complexity.

The above findings based on scheme design are varied from country to country and that what is effective in one area may not yield similar results in another. However there are opportunities for local authorities and service providers to learn from the above findings to carefully match the needs of the community being served.

Knowledge & Awareness

Pieters (1991) suggested information deficiency including mis-perceptions of self-knowledge has an important effect on recycling participation and unfamiliarity with recycling schemes often produces lack of participation. He also suggested pro-recyclers had greater understanding and felt much more informed about recycling than their non-recycling counterparts. Ellen (1994) identified that differentials between perceived and actual knowledge affected performance as individuals with a lower perceived than actual knowledge feeling less confident in decision-making. Also those individuals with overall lower knowledge levels were less inclined to participate due to conflicting messages. Vining and Ebreo (1990) and Jesson (2009)

suggested that information supplied to householders may be retained or forgotten due to level of personal interest and importance. In this regard a significant shift in an individual's attitude toward recycling was required to resolve conflicts or 'dissonance' between personal attitudes and information (Festinger, 1957; Do Valle, 2004; Mee et al, 2004; Hansmann et al, 2006).

Service satisfaction and participation

Participation in recycling programmes incurs both personal costs to the individual and benefits society as a whole with the collective good being divided amongst all citizens equally irrespective of participation (Pieters, 1991; Perrin and Barton, 2001, Timlett and Williams, 2011). However some individuals, for personal gratification, may rationalize that individual profit (personal benefit less personal cost) can only be achieved through non-participation (Pieters, 1991). Non-realisation of expected benefits was identified as a powerful demotivator and if participants are led to believe their efforts are wasted this can result in dramatic results in fall of participation rates. Pieters (1991) observed this phenomenon in which a Materials Recycling Facility with operational problems resulted in kerbside collected recyclables being dumped along with the refuse. This also resulted in a major drop in kerbside recycling tonnages when the information became public.

Other reasons for non-participation include preference for other schemes such as charitable donations of clothing, (Kilner, 1992) buy-back schemes for goods (Spaccarelli et al, 1989) or more convenient alternative schemes (Needleman and Geller, 1990). Negative neighbourhood normative influences (Spaccarelli et al, 1989) plus low ranking priority of recycling by the individual (Howenstine, 1993) also may inhibit participation even if attitudes to recycling are positive. It was also identified that attitudes to recycling between non-recyclers and pro-recyclers do not differ significantly, however the difference in behaviour between the two categories appears to result from inconvenience factors (De Young, 1989). This observation

shifted the emphasis in education programmes toward 'how to recycle' over 'why to recycle' (Shrum et al, 1995). Pieters (1991) identified that most misperceptions of inconvenience associated with recycling programmes arose prior to implementation, however, these fears tended to disappear upon peoples' experience of participation in the scheme.

2.2.3 Claimed and Observed Recycling Behaviour

In examining behaviour toward household waste recycling, Tucker (2001a, 2001b) observed that attitudes toward recycling appeared to be a major influence on household recycling behaviour. In his research, Tucker (ibid) observed that very few householders recycled magazines if they did not recycle newspapers. Similar responses toward recycling were observed based on recycling of food and drinks cans in that very few participants recycled these materials in isolation and were normally recycled along with glass and newspaper recycling activities. This suggests a relationship from the recycling of common materials such as newspaper and glass bottles in which behaviours and behavioural determinants such as attitudes influence recycling of other less common (at the time of research) materials such as cans and magazines. Households who did not recycle commonly collected materials therefore from Tuckers (ibid) research were less likely to recycle less common materials. The majority of people will claim to recycle, however the degree to which this takes place varies from material recycled and between communities. In addition, the results of surveys, which look at recycling participation, when compared with actual behaviour often differ due to both overstating and understating claims of recycling by participants.

Previous research into self-reported versus actual behaviour supports over reporting (RRF, 2002; Tucker 2003; Woollam et al, 2003). Rathje (1984) suggests that a respondent bias exists and that individuals when questioned tend to over-exaggerate their pro-environmental performance. He later suggested that this was due to a

disparity between what an individual should do, wants to do and what they actually do (Rathje, 1989). This finding was confirmed in studies by Ball and Tavitian (1992), Gamba and Oskamp (1994) and Tucker et al (1998); however few studies have directly quantified this effect with regard to recycling participation and efficiency. McGuire (1984) identified a correlation between reported household participation in recycling schemes and actual participation as measured by recording of set-out rates. This suggests that what people say they recycle and what they actually do vary significantly. Corral-Verdugo (1997) suggested that verbal reports are potential indicators of an ideal reality that are independent of instrumental reality, based on the differentials between self-reported and actual recycling behaviour. In order to obtain a greater understanding of these so called 'false claims' factors such as scheme provision and conversion of intention into behaviour is required. Sociological aspects will also need to be examined including structure of questionnaires and the level of understanding of interviewers and interviewees to identify any elements of misinterpretation.

McKenney and Hruska (1996) suggested many households' understanding of what constitutes recycling includes additional behaviours such as re-use of materials, home composting and waste minimisation, which if not recognised by the researcher will lead to misinterpretation of results. Removal of bias in household surveys is critical particularly if the respondents perceive they will be personally evaluated on their social behaviours leading to over reporting of responses that exaggerate more favourable qualities. This is described as the 'social desirability effect' (Gamba and Oskamp, 1994) and occurs where people report their attitude in the same survey as reporting their behaviours, artificially inflating the strength of their relationship.

Thogerson (1996) found that the magnitude of this bias from self-reports relating to the individual's level of frequency and participation might also affect the strength of their private (personal norm) and public conformity (social/group norm) regarding

recycling. McGuire (1984), through a comparison of information from measurements of questionnaire responses and actual refuse data, identified discrepancies in that the surveys may be measuring separate realities. When interview surveys are used to measure claimed behaviour the responses are more likely to reflect attitudes, ideas and beliefs rather than behaviour. Corral-Verdugo et al (1995), based on this observation, proposed the concept of a 'dual reality', which was further developed in 1997 into a model for re-use and recycling behaviour.

Barker et al (1994) developed an audit trail to specifically evaluate individual's claims against their actual recycling behaviour and identified that a high percentage of pro-recyclers failed to recycle paper in the facilities provided. Further research on this element by Tucker et al (1998) produced a list of differences between observed behaviour and self-reports by material type. These differences included 5% to 10% for paper, 20% for glass and 50% for cans. However, not all differences between self-reports and actual behaviour can be assigned specifically to 'social desirability' as incorrect interpretation of the question was a factor in the analysis (Werner and Makela, 1998). This can be related to Daniel and Ittelson's (1981) findings from analysis of interviews where in certain cases although self-reporting behaviour may be accurate, the method communicated to the interviewer may not necessarily be a correct answer to the question. Therefore households 'know they should recycle' want to and think they recycle; however in reality they do not recycle in accordance with the method communicated (Perrin, 2002; McDonald and Oates, 2003; Tonglet et al, 2004; Martin et al, 2006; Sidique et al, 2010).

2.2.4 Reprise on literature on individual determinants of household recycling behaviour

Concluding this review of behavioural determinants, it has consistently proven more of a challenge to identify socio-psychological determinants of recycling than

situational factors such as knowledge, awareness, scheme satisfaction, containers and barriers to recycling (Tucker, 2001). Much research on determinants of household recycling has been based on attitude/behaviour surveys designed to test specific hypotheses, which are selective in the relationships tested and have little uniformity in the questions asked. Examples of such research include that of De Young (1986), Derksen and Gartrell (1993), Vining and Ebreo (1990), Oskamp et al (1991), Vining and Ebreo (1992) who suggested that attitudes, norms, values and beliefs were key determinants of recycling behaviour. However, De Young (1986) also suggested that altruism was a significant determinant for encouraging recycling behaviour. The situation becomes more complex with the introduction of other socio-psychological factors and serves to highlight the lack of consensus in the findings from current research.

An example of this is from Tucker (2001a, 2001b) who suggested that attitudes, beliefs, values, personal norms and intentions although associated with positive recycling behaviour, should not be taken as providing a causal link between identified factors. The literature on individual determinants of household recycling behaviour is complex, diverse, contradictory and inconclusive with the research studies providing little consensus regarding the key determinants of household recycling behaviour. The next step was to identify what the literature conveys on the points identified from studies on individual behavioural determinants using behavioural models.

2.3 Modelling of behaviour

Having undertaken a critical review of the literature associated with determinants of recycling behaviour, the next stage in the process is to identify a means of illustrating how these determinants interact in influencing behaviour. A common approach to this is to use a model to illustrate behaviour and to test the suitability of the model in illustrating behaviour. Behavioural models are normally developed from a set of

constructs based on a form of causal relationship between dependent and independent variables. They offer dual benefits in terms of a simplified representation of a complex system or structure and provide a conceptual and theoretical framework in which to undertake detailed research on the structure of a specific behaviour and its key behavioural factors or determinants.

Models related to the behaviour of individuals are predominantly drawn from psychology and sociology disciplines (Darnton, 2007, 2008), which focus on understanding the factors influencing human behaviour. Most socio-psychological models tend to be consistent with standard economic theory in that they represent behaviour as a decision-making process. These are often consequently assuming behaviour involves pre-planning and is based on outcome expectations (Loewenstein et al, 2001). According to Darnton (2008), models of individual behaviour tend to be linear, or multilinear in shape and range between simple economic theories, based on cost-benefit decisions to investigation of the origins of behavioural preferences. The more complex models as in the latter example use a wider range of influencing factors or 'components', however, they present behaviour as the product of a deliberative process based on outcomes. Most socio-psychological models are used to examine the factors influencing individual behaviour from within an individual's psyche, such as social norms, values, beliefs and habits. However, other models may include higher levels of scale in which macro-societal components such as technology and the economy are included. These 'societal models' are typically used to develop policy and initiate behavioural change alongside intervention programmes. An example of a behavioural change model is that associated with Timlett and Williams (2011) infrastructure, service, behaviour or ISB model. This looks at the importance of situational variables (I & S) as well as variables that influence behaviour change (B).

The purpose of this thesis is to examine behavioural determinants of household recycling and not to develop a process or framework for application to policy development or to effect behavioural change. In this regard, the selection of a model to illustrate the determinants of household recycling would be one which identifies the underlying factors influencing behaviour. Models for illustrating recycling behaviour may be complex or simplistic in which the latter may result in a lack of conceptual understanding due to limited use of factors or relationships between factors and also may generate confusion over understanding of the behaviour under investigation. This dichotomy of 'complexity' versus 'simplicity' results in models being subject to varying degrees of criticism (Jackson, 2005).

Another issue for consideration in modelling behaviour is associated with the kinds of factors being examined. These factors may be 'internal' to the individual such as attitude, values, habits and personal norms or they may be 'external' such as regulatory and economic incentives, institutional constraints and social norms. The approach to studying these variables as a function of processes and characteristics are termed 'Internalist' and 'Externalist'. The former approach is predominantly associated with Cognitive and Social Psychology, whereas the latter is associated with 'Behavioural Analysis' and evolutionary/institutional economics. However, there is a certain degree of overlap with both approaches being associated with the sociology of consumption and the social logic of environmental consumer behaviour. In this regard selection of an appropriate model to represent recycling behaviour not only needs to strike a fine balance between simplicity and complexity but also incorporation of internal and external variables to provide completeness.

According to Jackson (2005) the starting point for considering models to investigate consumer behaviour is rational choice, which underlies conventional economic understandings of consumer behaviour. There are limitations regarding the application of economic models to environmental consumer behaviour including a

lack of a social dimension. Other models such as adapted expectancy-value have sought to address the deficiencies associated with rational choice; however these also have limitations in that they do not adequately encompass key internal and external aspects of environmental consumer behaviour such as household recycling.

The following section provides a review of a selection of behavioural, economic, adjusted expectancy value and other models in order to select an appropriate model which addresses the internal and external aspects of household recycling whilst striking a balance between complexity and simplicity. This includes a review of models that have not been used for examination of recycling or even environmental behaviour. Table 2.2 provides a list of socio-psychological models, some of which have been used to examine household recycling behaviour.

Table 2.2: Socio-psychological models at individual level (from Jackson, 2005)

Social Psychological Theory /Model	Key References	Description
Economic Assumptions		
Rational Choice Theory	Elster 1986, Homans 1961 etc.	Behaviour is the outcome of rational deliberations in which individuals seek to maximise their own expected 'utility'.
Subjective Expected Utility (SEU)	Ajzen and Fishbein 1980, Eagly and Chaiken 1993	Related to the rational choice model, SEU suggests that behaviour is a function of the expected outcomes of the behaviour and the value assigned to those outcomes.
Value, Belief, Attitude		
Elaboration-Likelihood Model	Petty and Cacciopo 1981	A persuasion model which predicts that the long-term success of a persuasive message depends on how much mental processing or 'elaboration' of the message

		is undertaken by the subject (target).
Expectancy-Value Theory	Fishbein 1973, Ajzen and Fishbein 1980	Based on the idea that behaviour is motivated by the expectations about the consequences of behaviour and the values attached to those outcomes.
Theory of Reasoned Action (TRA)	Ajzen and Fishbein 1980	The TRA adjusts expectancy value theory to incorporate normative social influences on behavioural intention.
Social Norms and Self-identity		
Norm Activation Theory	Schwartz 1977, 1992	One of the most well-known attempts to model pro-social or altruistic behaviours: a personal norm (PN) to behaviour in a pro-social way is activated by awareness of the consequences (AC) of one's actions and the ascription of personal responsibility for them (AR).
Value-Belief-Norm Theory	Stern et al 1999, Stern 2000	An attempt to adjust Schwartz's Norm Activation theory to incorporate a more sophisticated relationship between values, beliefs, attitudes and norms.
Agency, Efficacy and Control		
Structuration Theory	Giddens 1984	Attempts to provide a model of the relationship between agency (how people act) and structure (the social and institutional context). Giddens structuration theory relies on a distinction between 'practical' and 'discursive' consciousness.
Structuration and social practice	Spaagaren and Van Vliet, 2000	Model of change based on the need to raise environmentally-significant behaviours from practical to discursive consciousness.
Theory of Planned	Ajzen 1991	Adjusts the Theory of Reasoned Action to

Behaviour (TPA)		incorporate the actor's perceived control over the outcomes of his or her behaviour.
Habit and Routine		
Interpersonal Behaviour (TIB)	Triandis 1977	Like the Theory of Reasoned Action the Theory of Interpersonal Behaviour (TIB) includes both expectancy-value and normative belief constructs. However, TIB also includes the role of habitual, social and affective influences on behaviour.
Integrated models of behaviour		
Attitude-Behaviour-Context (ABC) Theory	Stern and Oskamp 1987, Stern 2000	A kind of field theory for environmentally significant behaviour. Behaviour (B) is an interactive product of 'internal' attitudinal variables (A) and 'external' contextual factors (C)
Motivation-Ability-Opportunity model	Ölander and Thøgersen 1995	An integrated behavioural model that combines both internal motivational variables – usually based on the Theory of Reasoned Action - with external contextual variables of ability (including habit and task knowledge) and opportunity.
Subjective Utility and Behaviour	Franco & Huerta 1997	Recycling specific model based on utility of recycling and influence of behaviour
Theory of Trying and Consumer action model	Bagozzi and Warshaw 1990; Bagozzi et al 2002	Theory of trying based on prediction of consumer behaviour from the perspective of trying to act. Consumer Action model based on extension of the theory of trying into comprehensive model of goal directed consumer action.

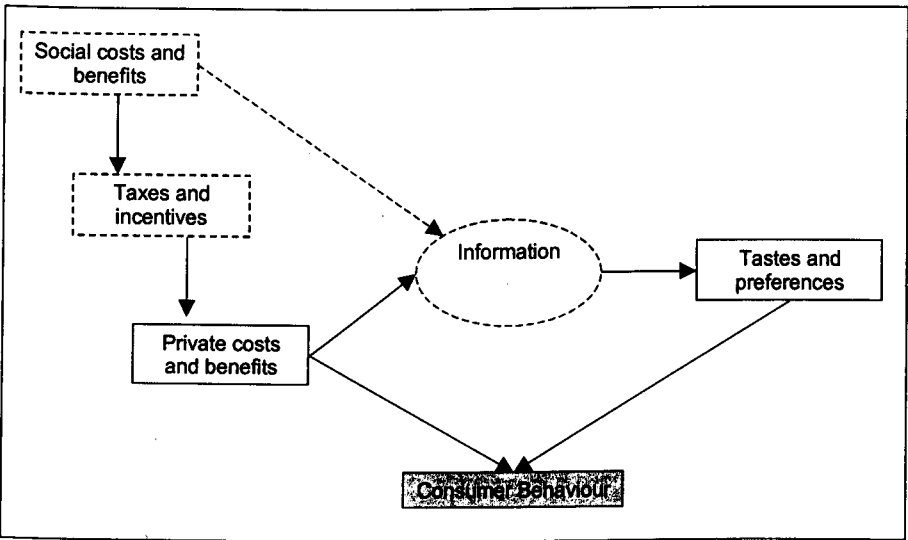
2.3.1 Economic models, expectancy value and rational choice

One of the most widespread and deeply entrenched theories in Western society models is the 'Rational Choice Theory' (Elster, 1986). This theory operates on the premise that individuals behave in such a way as to maximise the expected benefits to themselves from their actions. Models arising out of rational choice theory are often referred to as 'Expectancy-Value' models (Fishbein, 1973). The 'Expectancy-Value Attitude Theory Model' is used empirically to test and predict consumer attitudes. It is based on the theory that a consumer's attitude or preference for an object (product, service, etc) can be resolved in terms of two measurable antecedents. These are beliefs (b_i) or 'Expectancy' regarding the purchase; and evaluation (e_i) of the characteristics 'Values'. This is expressed in accordance with Equation 1 below:

Equation 1: Expectancy - Value

$$A_{obj} = \sum_{i=1}^n b_i e_i$$

Figure 2.1: Rational choice model (from Jackson, 2005)



The 'Rational Choice Model' illustrated in Figure 2.1, is based on key assumptions that human behaviour is a continual process of making deliberative choices between distinct courses of action. These assumptions are listed under three main headings:

1. Choice is rational;
2. The individual is the unit of analysis in social activity;
3. Choices are made in the pursuit of self-interest

According to Rational Choice Theory the expected benefits and costs of the different actions are compared against each other with the option providing the greatest net benefit or lowest net cost being selected. One of the key features of the rational choice model (ibid) is the emphasis on the individual as the unit of analysis.

Individuals, according to the model, make their choices on the basis of rational deliberation that comprise individual evaluations of subjectively expected outcomes. The value attached to the outcomes is one of utility of the outcome for an individual. Social behaviour in accordance with rational choice is regarded as an emergent property of a set of individual behaviours, where each action results from deliberative choices based on the Subjective Expected Utility (SEU) of the individual. In this regard to maximise utility the individual needs to possess perfect information including a range of possible goods and their prices, which is rarely possible if not impossible. The maximisation of SEU may therefore be challenged in that real life decisions do not have perfect market information and according to Simon (1957), actors involved in a decision-making process face uncertainties about the future and costs in acquiring information regarding the present situation. In this regard Simon's 'Bounded Rationality Model' (ibid) based on 'satisficing' through establishing a minimum level of choices the individual would be happy with, does not accord with rational choice theory. The Rational Choice model may be useful in establishing the individual costs and benefits of purchasing recycled goods, subject to limitations of

imperfect knowledge. However with regard to non-purchasing behaviour such as household recycling it is subject to challenge. A particular area of challenge is that only a limited proportion of environmental behaviour can be regarded as flowing from self-interested value orientation, which for many individuals may not include household recycling. An example of this includes altruistic and biospheric value-orientation which may influence pro-environmental behaviour; however these do not necessarily incur net private costs to the individual as required under rational choice. In terms of individuality, '*Methodological individualism*'¹⁴ embedded within rational choice reflects the concept of individual choice, individual rights, and supremacy of individual preference in defining market economies structure and western culture.

According to Granovetter (1985) and Zey (1992), Methodological Individualism may be challenged on the basis that it is an under-socialised account of human agency that overlooks understanding of self and other relationships and the nature of real life decision-making. Self-interest based on moral grounds also compounds the problem of accounting for social structure within Methodological Individualism, which is suggested to be '*Antecedent*' to individual behaviour. Behaviour dominated by self-interest fails to protect society's long-term interests; however self-interest is often forsaken for moral sentiments and altruistic motives (Frank, 1988). Finally, Tversky and Kahneman, (1974) argued that the presence of heuristics and biases associated with routine or habitual behaviour, such as household recycling confound the deliberative decision-making process inherent in rational choice theory.

Therefore taking all of the above challenges to rational choice into account, the application of the rational choice model for examination of household recycling determinants is considered at best weak. In addition, the circular nature of Rational Choice does not provide a robust alternative to the concept of sociality and the

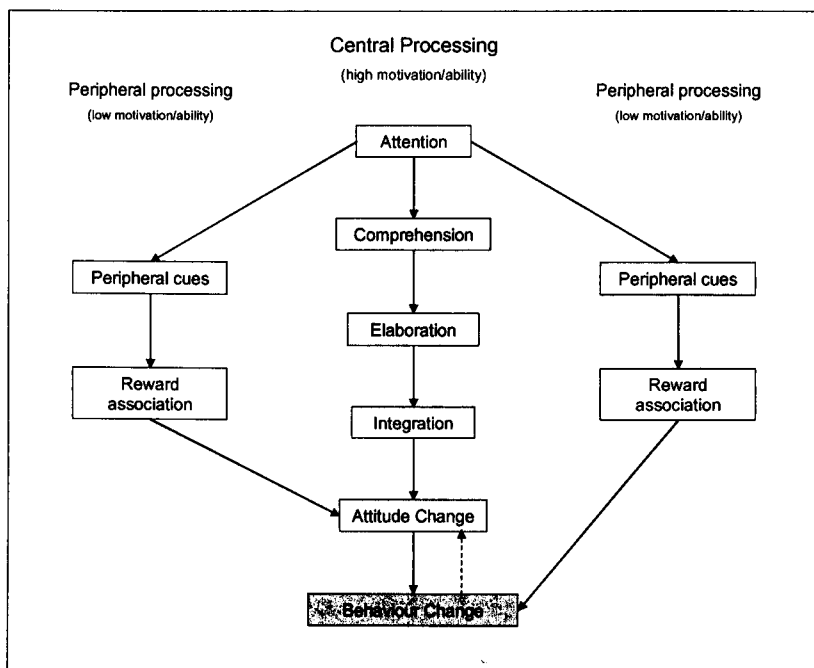
¹⁴ Individuals are rational self-interested maximisers of subjective utility with social behaviour being an emergent property of individual behaviours and actions of which it is composed (Elster, 1986).

relations between self and individual action (Jackson et al, 1993). Based on this and other arguments discussed above, the rational choice model is not considered a suitable means to illustrate household recycling behavioural determinants.

Persuasion models

As rational choice was considered unsuitable for examining household recycling behaviour, the Elaboration Likelihood Model (ELM) was considered. The ELM illustrated in Figure 2.2 is based on the work of Petty and Cacioppo (1977, 1981, 1986) who investigated the effects on attitude change when people process information systematically. They found that when people respond to superficial messages or 'heuristic cues' the information used to undertake a behaviour is processed automatically and is referred to as the '*Peripheral Route to Persuasion*'. Conversely, they suggested an alternative process is involved in decision-making where attitude change occurs as the result of mindful attention to the content of a persuasive message, elaboration of its implications and integration into an individual's attitude.

Figure 2.2 Elaboration Likelihood Model – (Petty & Cacioppo 1986)



In this regard the individual's decision to act is based on the information evaluated against their existing knowledge. This systematic processing of information places less importance on superficial messages for automatic processing and is termed the '*Central Route to Persuasion*'.

The dual processing concept was explored further by Stanovich and West through their **System 1/System 2 cognition** (Stanovich and West in Kahneman, 2002). This postulates that cognition is a dual process where System 1 involves 'intuition', 'automaticity' and is 'effortless' and 'fast' and conversely, System 2 involves 'reasoning', 'deliberative', and is 'effortful' and 'slow'. Both systems run simultaneously however, for intuitive processes, System 2 takes impressions from System 1 and makes explicit judgements. In this regard it conceptualises decision-making as both more and less rational depending on the situation. Using this approach, decisions associated with household waste recycling would be based on System 1 processing and would involve low levels of deliberation. However, more conscious decisions such as buying a house or car would be expected to involve system 2 processing. In this regard cognitive process involves both controlled and automatic attributes operating simultaneously with an example of this being putting out the recycling container automatically but exerting cognitive effort in determining what goes in the recycling container.

Tversky and Kahneman (1974) and Jackson (2005) suggested that degree of control increases with degree of involvement of the decision-maker, which is influenced by the degree of importance of the decision. Therefore, when the consequences of performing an action are significant the attention of the individual increases and so does the cognitive effort, however this attention decreases on less important tasks with decision-making relying on the use of heuristics. Kahneman (1973) proposed that this attention may be involuntary or voluntary. He suggested that task complexity was a key factor in the level of cognitive effort involved and the degree of constraint

associated with the decision. These constraints included time, cognitive capacity and access to knowledge. Of these factors, time was considered to be the driving factor in the reliance of heuristics in decision-making when a time limit is in operation for completion of a task. The strengths of the ELM/System 1 and 2 models are they are simplistic and may be used to explain how change in household recycling behaviour may be directed. However, the shortcomings from this model include the absence of other factors such as social factors. Furthermore, the model is based on a reward suggesting a utility function (see rational choice model). Based on the above the ELM/System 1 and 2 is not considered a suitable application to examine the behavioural determinants of household recycling.

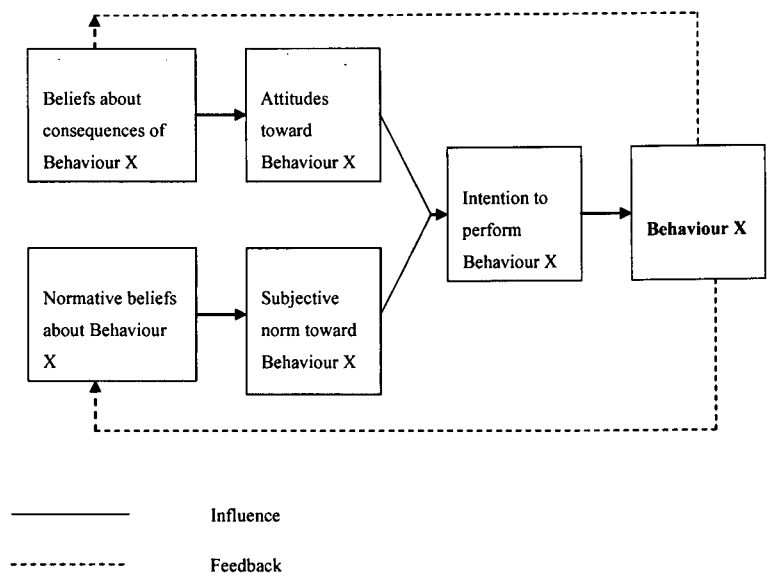
2.3.2 Adjusted Expectancy-Value Theory

A number of alternative consumer behaviour models were developed that accommodated the critiques levelled at the rational choice theory. Many of these models retained the Expectancy-Value structure of rational choice but differed from conventional 'Consumer Preference Theory'. These differences included a non-assumption of various underlying utilities, a better explanation of the Expectancy-Value structure and, an incorporation of Social Influence, moral concern and habit into the basic E-V structure. The rational consumer makes choices that maximise A_{obj} , (see Equation 1); however, adjusted E-V models transcend beyond Consumer Preference Theory in order to identify attitudes toward the object.

Theory of Reasoned Action

Fishbein and Ajzen (1975) and Fishbein (1980) 'Theory of Reasoned Action' (TRA) postulated that combined attitudes and social norms produce behavioural intentions, which will only result in behaviour (action/activity) provided the behaviour (action/activity) is easy to carry out. The TRA illustrated in Figure 2.3 is based on individuals behaving according to their beliefs about the outcomes associated with their actions, and the values they attach to those outcomes.

Figure 2.3: The Theory of Reasoned Action (TRA) Model (Fishbein and Ajzen)



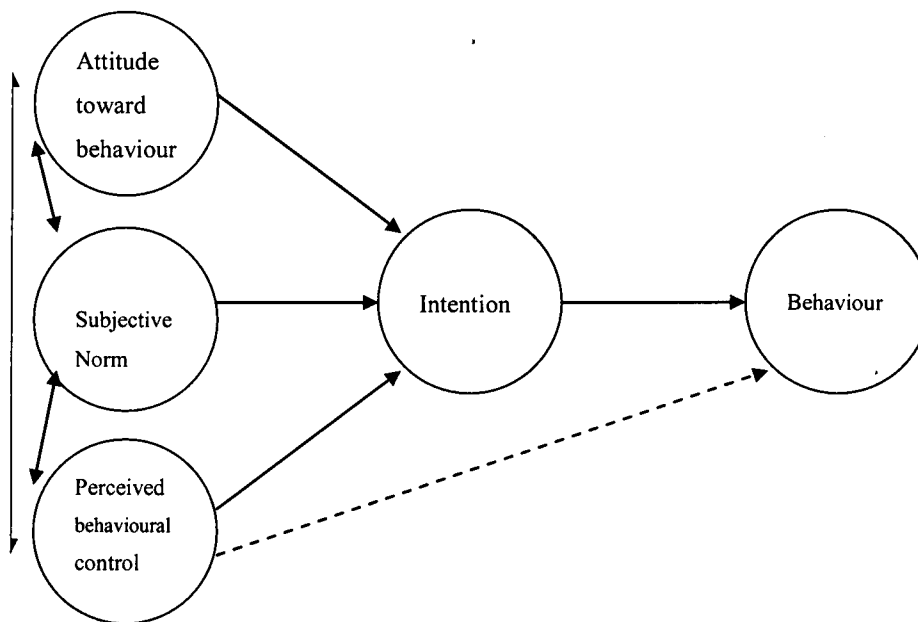
Adapted from Understanding Attitudes and Predicting Social Behaviour by Ajzen/Fishbein, © 1980. Adapted by permission of Prentice-Hall, Inc, Upper Saddle River, NJ

The resultant beliefs and evaluations of outcome result in attitude toward the given behaviour, which is one of two primary influences on an individual's intention to act, where intention is the antecedent and key determinant of behaviour. The second primary influence in the TRA is the individual's 'Subjective Norm', which is based on the perceived level of activity by the individual from others important to that individual (Ajzen and Fishbein, 1980). This is different to an individual's 'Personal Norm' or personal belief regarding the morality of the given behaviour. Subjective norm however is a social normative influence and is suggested to be the result of an evaluation by the individual of the descriptive and prescriptive (Cialdini et al, 1991) social norms. The TRA is based on assessment of the consequences of an intention to do something where positive and negative ratings and subjective probability of occurrence are assigned to attitude and subjective norms to provide a prediction of intention. The TRA is one of the most popular models used to examine recycling behaviour. An example of a modified use of the TRA in terms of household recycling is Goldenhar and Connell's (1993) Path Analysis of Recycling Behaviour.

The Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB) (Ajzen & Madden, 1986; Ajzen 1991) model is a later modification of the TRA.

Figure 2.4: The Theory of Planned Behaviour



Adapted from *Organizational Behaviour and Human Decision Processes* by Ajzen, © 1991.

Adapted by permission of Prentice-Hall, Inc, Upper Saddle River, NJ.

This model extends the TRA to take into account 'Perceived Behavioural Control' (PBC). The TPB is illustrated in Figure 2.4. PBC or 'agency' is defined as 'the individual's belief as to the level of difficulty performance of the behaviour is likely to be' (Ajzen and Madden, 1986). The TPB is designed to predict behaviour over behavioural intention. It is capable of incorporating affective determinants only so far as they are modelled as attitudinal beliefs about, or evaluations of, the outcomes of specific actions (Jackson, 2005). A number of studies have used the TRA and TPB models, in which behaviour is a function of intention, that itself is influenced by an individual's attitudes and norms.

Adjusted Expectancy-Value type models such as the TRA and TPB in their application to illustrate household recycling behaviour determinants may be challenged on a number of fronts. Firstly personal norms are considered by Ajzen and Fishbein (1980) to be subjective beliefs and did not merit being assigned a separate elaboration. Other researchers (Schwartz, 1977; Triandis, 1977; Manstead and Parker, 1995; Conner and Armitage, 1998) suggested that personal norms should be examined separately to social norms as they are internal to the individual and not externally influenced as in social norms. Secondly habit is absent, which could be a major determinant in routine behaviours associated with waste and recycling. Other factors not specifically addressed by the TRA/TPB include affect, cognitive deliberation, situational factors and self-identity.

Another criticism of the TRA/TPB is that studies are limited by what they can discover through questionnaires and interviews (Gagne and Godin, 2000). The success of the use of these models therefore depends on the ability of the researcher to correlate intentions of behaviour with its determinants or 'antecedents'. Both the TRA and TPB assume an intention-behaviour linkage, which is suggested to be predominantly applicable where there is a degree of volitional control (Ajzen and Madden, 1986). The TPB (ibid) was designed to address situations which were not under volitional control. However, the two predictors of behaviour namely intention and PBC in accordance with the TPB (ibid), do not specifically address the influence from habit and situational factors used in other models (Triandis, 1977; Olander and Thogerson, 1995) which may be critical to explain household recycling behaviour. Foxall (1997a) provided a comprehensive critique of the TRA. A critique of the TPB is also included in Davies (2000) and Davies et al (2002) with a main criticism being an assumed contiguity between intention and behaviour. There is also a difficulty measuring PBC compared with control beliefs and most importantly only one new variable (PBC) is introduced. To address the limitations of the TRA/TPB a number of studies have included additional factors such as personal norms (Sparks

and Guthrie, 1998), past experience, situational factors and consequences (Tonglet et al (2003, 2004); Davis et al (2006). Although Ajzen (1991) identified the TRA/TPB as open to further elaboration, Bagozzi (1992) argued that while offshoots of the TRA/TPB may accommodate wider realms of social behaviour, they may render the structure of the original models haphazard. Both the TRA and TPB may be used to investigate recycling behaviour and add to the current level of understanding. However, an original largely unmodified behavioural model would be a better option.

2.3.3 Moral and Normative Models

A common misconception regarding pro-environmental behaviour is that individuals act in accordance with altruistic or moral reasons. It has been identified that this is only partly the case, and that self-serving interests can also motivate individuals. There is therefore a normative dimension that needs to be considered in order to understand pro-environmental and in particular household recycling behaviour. Adjusted Expectancy-Value models such as the TRA and TPB reviewed in the previous section, incorporate normative influences through the use of Subjective Norms, however this concept does not fully address normative influences in terms of moral values in individual behaviour. To address this dilemma a group of theories that focus explicitly on the moral and normative dimensions of human behaviour were developed by Schultz (1998). Examples of these specific to household management behaviour are discussed in the following sub-sections:

Ecological Value Theory

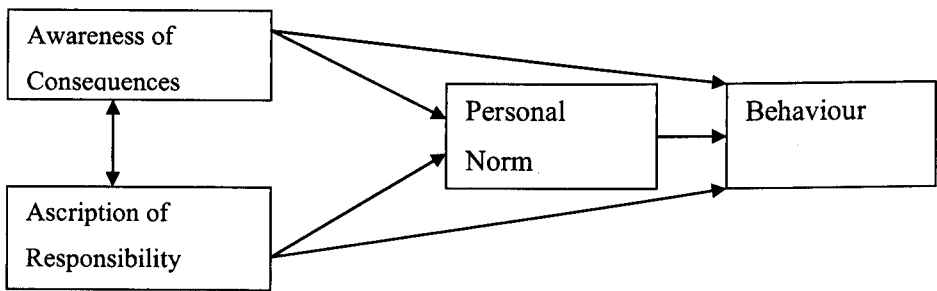
The '*Ecological Value Theory*' is based on the concept that if pro-environmental behaviours flow directly from pro-social or moral values then if the individual subscribes to moral or altruistic values they are likely to engage in pro-environmental behaviours (Schwartz, 1977). This was derived empirically from value orientations in society, which include self-enhancement (self-regarding), self-transcendent (other regarding) and biospheric (environment valuing). The resultant value model

hypothesis posits that individuals who espouse primarily self-interested values are less likely to engage in pro-environmental behaviour than those with self-transcendent values. Studies have also demonstrated that there is no general correspondence between biospheric and pro-environmental behaviours and that motivation can be via all three values.

Norm Activation Theory

Another normative model is based on Schwartz's (1977) Norm Activation Theory, the Model of Altruistic Behaviour (MAB) illustrated in Figure 2.5, which posits that personal norms are the only direct antecedents of pro-social behaviour.

Figure 2.5: Schwartz's Model of Altruistic Behaviour



Schwartz (ibid) further proposed that as personal norms are feelings representing strong moral obligation experienced by individuals to engage in a particular behaviour, intentions to mediate this behaviour are likely to be rejected. Schwartz's (ibid) theory differs from the TRA concept in that the MAB uses personal norms over subjective or social norms based on the premise that some behaviours are intended to benefit others as an expression of internal personally held values without regard for social and material reinforcements. He also regards internalised personal norms as having two direct antecedents, which include 1) Awareness of the consequences of an individual's actions and, 2) Acceptance of personal responsibility an individual holds for the consequences of their actions.

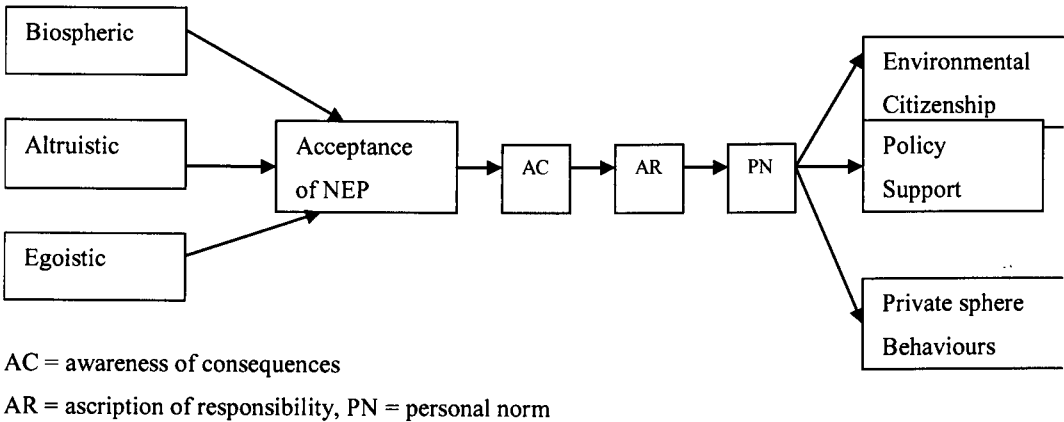
The Schwartz model however heavily relies on the relationship between personal norm and its psychological factors for the behaviour to occur. This relationship is also moderated in accordance with the strength or weakness of external situational constraints. In this regard where an individual accepts the responsibility for their behaviour and is aware of the consequences it is more likely they will engage in that behaviour than that of an individual who is unaware of the consequences and denies responsibility for their actions. The Schwartz model has been used to investigate a number of pro-environmental behaviours including household recycling behaviour (Vining and Ebreo, 1990, 1992; Hopper and McCarl-Nielsen, 1991; Guagano et al, 1995; Davies, 2001). One of the studies (Hopper and McCarl-Nielsen, 1991) found that social influence from more formal sources (for example block leaders) resulted in increased recycling behaviour and more frequent endorsement of personal norms regarding recycling. This suggests that prevailing social norms affected personal norms only when the individual was aware of the consequences of recycling. Vining and Ebreo (ibid) illustrated that attitudes toward recycling assessed by the Schwartz (ibid) constructs were more effective predictors of self-reported recycling behaviour than measures of general environmental concern.

A variation of the Schwartz (ibid) model was developed by Stern et al (1999) as an exercise to link Schwartz's (ibid) model to ecological value theory. Stern et al (ibid) based their 'Value Belief Norm Theory' on the premise that the New Environmental Paradigm NEP¹⁵ (Dunlap and Van Liere, 1988) related to the awareness of consequences in the Schwartz MAB model. The degree of acceptance of the NEP is positively correlated with biospheric and altruistic values and negatively correlated with egoistic values.

¹⁵ Model which includes a set of core values, distinct from the Dominant Social Paradigm, which paid increased respect to natural limits and the importance of preserving the balance and integrity of nature.

A Personal Norm is therefore developed in the Value-Belief-Norm model to engage or not in pro-environmental behaviour. This concept is illustrated in Figure 2.6.

Figure 2.6 Stern's Value-Belief-Norm Model



However, despite the positive findings from use of the Schwartz (ibid) model (and Stern's variation) to recycling behaviour other factors including habit, situational factors, social norms are absent from the model. However, the addition of more factors to the model may result in a haphazard structure as suggested from Bagozzi (1992). The findings of the research by Stern et al (ibid) as discussed under the altruism factor in Section 2.2.1 were that further empirical work was required which has not been undertaken to date. In this regard and based on the review of this model it was not selected for investigation of household recycling for this thesis.

2.3.4 Integrated models

The behavioural models discussed in the previous sections examine behaviour mainly as a function of processes which are considered internal to the individual. These include attitudes, personal norms, values habits and other internal factors. Other approaches include examination of factors which are external to the individual including social practices, fiscal and regulatory incentives and situational factors. The first (internalist) perspective suggests that individuals operate autonomously outside of a social structure whereas the second (externalist) perspective suggests that

individuals as consumers are constrained or heavily influenced by external forces outside of their volitional control (Jackson, 2005). Clearly the two perspectives would play a major role in the determination of recycling behaviour, and a number of integrated models containing internal and external factors are considered in the following section.

Structuration and Social Practices

Scientific debate surrounding an internalist-externalist dichotomy concerning the relationship between 'agency' and 'structure', looks at whether consumer behaviour is influenced by human action or by the social institutions comprising the framework for human action. This basic dilemma is expressed in the question from Jackson (2005 pp 80-81):

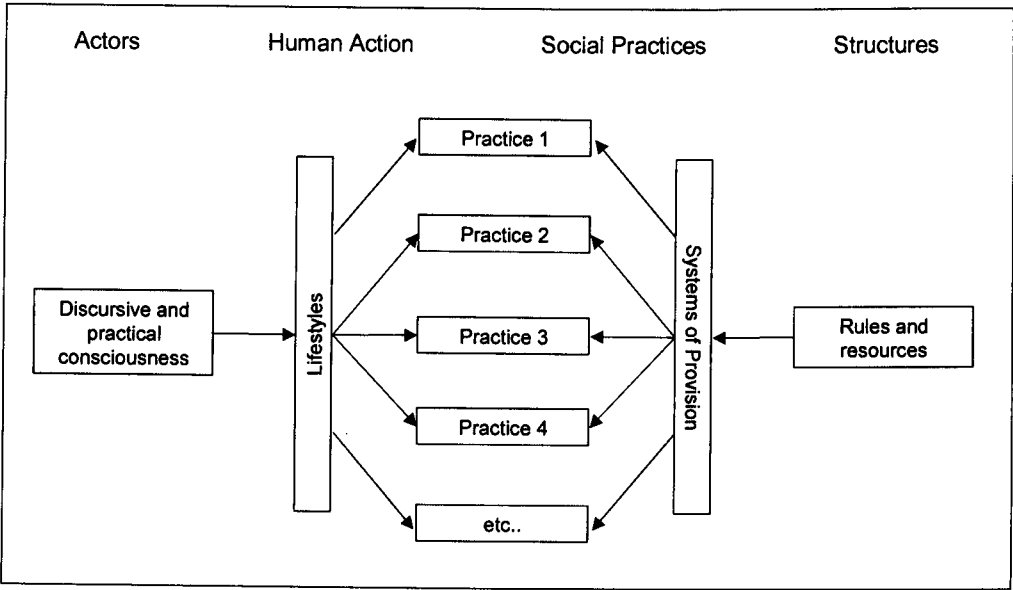
"Are humans capable of autonomous directed social action or are they entrenched in historical and social processes over which there is no individual or collective control?"

Giddens (1984) structuration theory attempted to explain the interaction between ordinary everyday routine action and long-term large-scale evolution of social institutions. One of the key elements from this theory is the distinction between 'practical' and discursive consciousness with the former being associated with everyday knowledge that people have about how to do things. Practical consciousness therefore depends on commonly accepted knowledge and that usage in familiar, routine (reutilized) situations and behavioural contexts (Giddens, 1984). Discursive consciousness, however suggests that social actors have an awareness of action and that this awareness has a discursive form, which is proscribed through social discourse. However, discursive consciousness does not describe a process of continual rational deliberation over individual actions but more so accounts of intention are generally produced during or after action, rather than before it.

Agency is therefore for the most part, the process of being enmeshed in the repetitive, routine practices of everyday life, and the distinction between practical and discursive consciousness clearly has some linkages to understanding routines and habits. It also has some important implications in terms of motivating pro-environmental behaviour. Spaargaren and van Vliet's (2000) model looks at this distinction in terms of raising environmentally-significant behaviours from practical to discursive consciousness before they can be changed.

In terms of applicability of normative models for the examination of household waste recycling behaviour as with the economic models they are limited in their range of variables. In this regard they do not take into account external factors such as facilitating conditions or procedural rationality (habit), which play a key role in such behaviour.

Figure 2.7 Structure of consumption practices (Spaargaren & Van Vliet 2000)



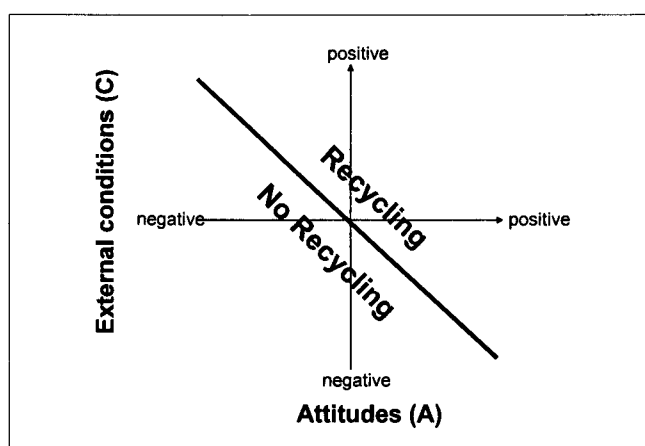
The deployment of the structuration model (Spaagaren and Van Vliet, 2000) in Figure 2.7 also suggests limitations as in the economic models associated with

rational choice and would best be suited for examination of behavioural change from intervention programmes as opposed to examination of behavioural determinants.

Stern's Attitude-Behaviour-Context Model

In an effort to overcome the internalist-externalist dichotomy, Stern (2000) and his colleagues Guagano et al (1995); Stern et al (1999) developed an integrated attitude-behaviour constraint (ABC) model of environmentally significant behaviour. This is a 'cause-effect' model, which draws on Lewin's (1957) field theory where behaviour is seen as a function of the organism and its environment. It was developed on the hypothesis that actions or behaviours are associated with attitudes, which can be positive or negative with external conditions. These external conditions include all sources of opposition or support to behaviour and that for any population there are distributions of A and C for any behaviour. The effect of A and C on behaviour depends on their value relative to each other and behaviour is therefore present when $A + C > 0$ and absent when $A + C < 0$. Figure 2.8 illustrates this concept

Figure 2.8: Stern's Attitude-Behaviour-Context Model applied to recycling



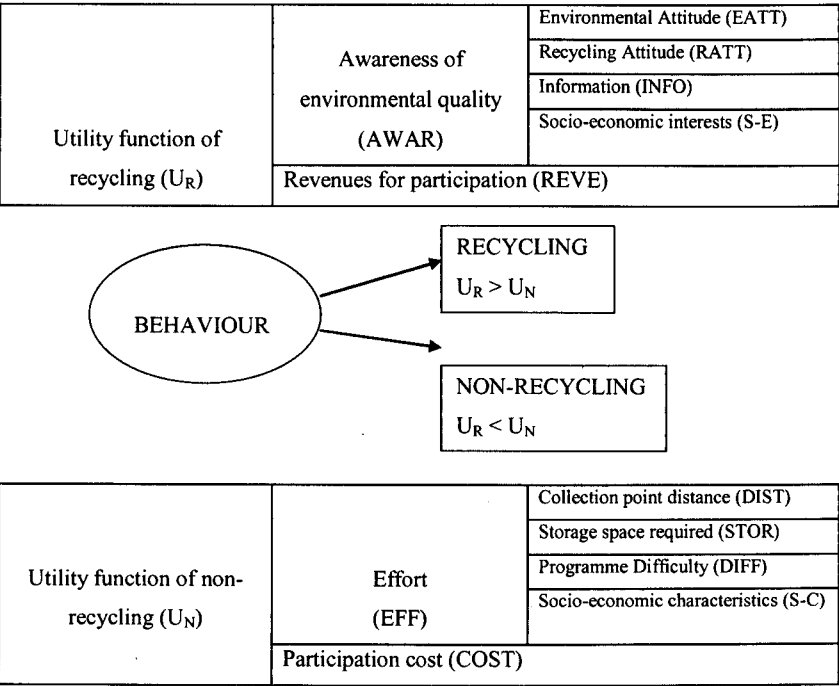
The structural dynamics between the influence of attitudes (internal) and contextual (external) factors is a key dimension of the ABC model. According to the ABC model

as seen in Figure 2.8, when access to recycling facilities is either very easy or very difficult, i.e. external factors are very positive or very negative, the attitude held by individuals on pro-recycling issues does not impact on their decision to recycle. In the first instance everybody participates in recycling and in the second case no-one participates. Research by Olander and Thogerson (2006) on the use of the ABC model regarding source separation of kitchen waste gave positive results. The model was evaluated by Olander and Thogerson (ibid) as a diagnostic tool for policy intervention and not an explanatory model as required for the selection criteria for examination of behavioural determinants of household recycling behaviour.

Utility of Recycling Model

The concept of the utility of recycling being greater than the utility of not recycling would persuade an individual to recycle resulted in the development of the model by Franco & Huerta (1997).

Figure 2.9: Model for Recycling Participation (Franco & Huerta, 1997)

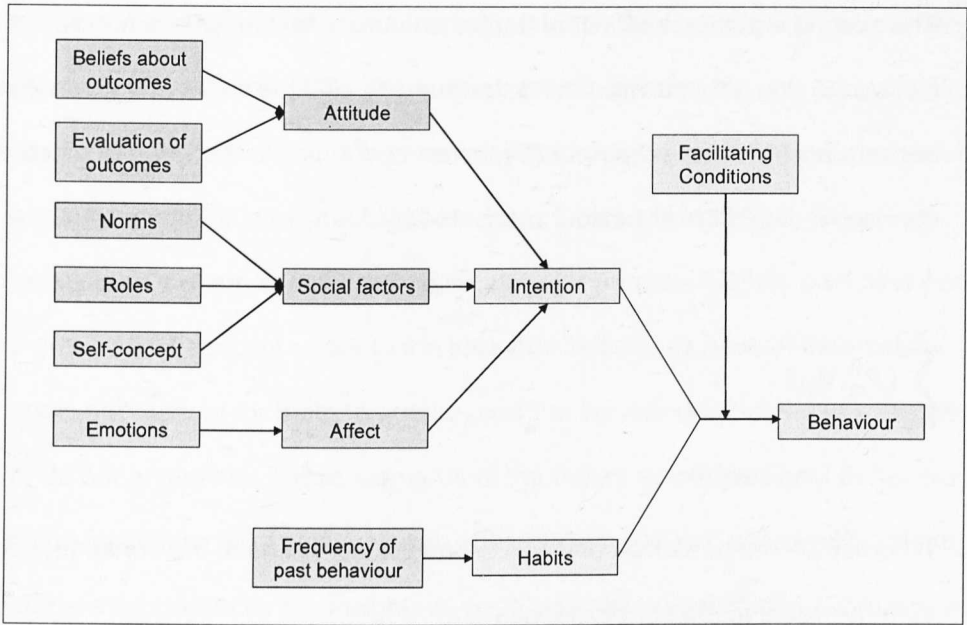


A number of conclusions were derived from this model principally individuals will participate if personal satisfaction is greater than effort required to do so. Personal satisfaction is therefore inversely proportional to the level of effort required to participate. Also satisfaction levels are directly proportional to the level of awareness with factors such as attitude and level of information determining the level of increase or decrease in satisfaction. An illustration of the Franco and Huerta model is provided in Figure 2.9. Although the Model for Recycling Participation (Franco & Huerta; 1997) is designed specifically for recycling it appears to be based on utility function and may be subject to the shortcomings of the expectancy value type models. However, the social elements are combined with economic interests and there is an absence of habit and personal norms and the model appears to be based on use with recycling scheme design as opposed to behavioural determinants. There have, to date, been no other applications of the Franco and Huerta (ibid) model or use of the model by other researchers in household recycling. This provides a minimal track-record and due to its design the model is more suited to service design than investigation of household recycling behaviour determinants. In this regard the Franco and Huerta model was not considered suitable to assess recycling behaviour determinants.

Theory of Interpersonal Behaviour

Triandis (1977) recognised the key role of social factors and emotions in the formation of intentions and highlighted the importance of past behaviour on the present. Triandis' Theory of Interpersonal Behaviour (TIB) encompasses many of the behavioural determinants found in other psychosocial theories including the TRA and TPB; however, it also includes cultural, social moral and habit factors, which are important in studying interpersonal behaviour. The TIB model is shown in Figure 2.10.

Figure 2.10: Triandis' Theory of Interpersonal Behaviour (from Jackson, 2005)



The TIB is based on a relationship between intention and behaviour and habit and behaviour which is reflected in the two equations below:

$$1. P_a = (w_H H + w_I I) P.F$$

$$2. I = w_S S + w_A A + w_C C$$

The first equation is based on the probability of an act's occurrence (P_a) being a function of the sum of habits (H) plus behavioural intention (I) multiplied by the organism's arousal (P), which reflects the physiological state of the individual and can be zero when asleep and 1 when extremely aroused, and by facilitating conditions (F). P_a the probability of the act is indexed by a number between 1 and 0; w_H and w_I are weights; I is based on self-instruction to perform the act. F reflects the objective conditions of the geographical environment which facilitate the act and are close to 1 when conditions are optimal and close to 0 when they are most unfavourable for the performance of the act; and; H relates to performance of the act reflecting automatic behaviour tendencies developed during the past history of the individual, such that particular stimuli elicit the act even when the individual does not self-instruct to perform the act.

The second equation states that the behavioural intention (I) is a function of social factors (S), the affect toward the behaviour (A), and the value of the perceived consequences of the behaviour (C). In terms of C this is the value of n perceived consequences of the behaviour measured by:

$$\sum_{i=1}^n (P_{ci} \cdot V_{ci})$$

Where: P_{ci} = the perceived probability that the act will have the consequence i, and
 V_{ci} = the value of the consequence i

The social factor (S) reflects the individual's internalisation of the subjective culture of the group, therefore the norms, roles and values (NRV) of the culture (objectively outside the individual) have direct connections with the perception of the NRV that the individual uses to subjectively judge the appropriateness of social behaviour. Judgement of the appropriateness of the individual's behaviour is associated with the personal norm and self-identity of the individual. The affect (A) toward the behaviour reflects the direct emotional response to the thought of behaviour. These may be via classical conditioning or human genetics. The value of the perceived consequences (V_{ci}) of an act reflects the expectation of reinforcement as well as the values of the perceived consequences. The TIB was developed around the same time as the Theory of Reasoned Action (Fishbein and Ajzen, 1975) but was overlooked by researchers for investigation of environmental applications. However its popularity increased in the 1990s and is commonly associated with responses to medical surveys (Gagnon et al, 2006).

In the Triandis model, attitudes or perceived value of expected consequences, play a key role in mediating intentions, as suggested in the Expectancy-Value Theory (Ajzen and Fishbein, 1977). Regarding social factors norms, are conceptualised similar to that by Cialdini for injunctive social norms – in other-words, social rules about what should and should not be done. Roles are identified as 'sets of behaviours that are considered appropriate for persons holding particular positions in a group'. Self-concept refers to the idea that individuals have of themselves, the goals appropriate for them to pursue, and the behaviours that they as individuals do or do not engage in. These elements of the theory of interpersonal behaviour draw some legitimacy from social psychological theories of self and identity (Mead, 1934) and are supported by the insights of social identity theory (Tajfel 1978) and self-discrepancy theory (Higgins 1987) in particular.

An individual's behaviour according to Triandis (ibid) is a function comprised of what is intended, habitual responses, and situational constraints and conditions under which they operate. Intentions are in turn influenced by social, normative and affective factors as well as by rational deliberations. According to Triandis (1980) there is a central relationship between habit, behaviour and behavioural intention which is reflected in two relationships. The first relationship is based on the probability of an act's occurrence (P_a) being the sum of the habits (H) plus behavioural intention (I) multiplied by the facilitating conditions (F) and stimulation (P). Therefore, the greater the individual's ability to perform the behaviour, the greater the H factor in which behaviour is driven by procedural rationality (H control). Conversely for new activities, control of behaviour is under intention. This provides a powerful means of linking intentions formed from attitudes and social factors and moderated by facilitating conditions with habit. The second relationship according to Triandis is the role played by social factors and emotions in forming intention. This was based on behavioural intention being a function of social factors (S) the affect (A) toward the behaviour and the evaluation (E_c) of the perceived consequences

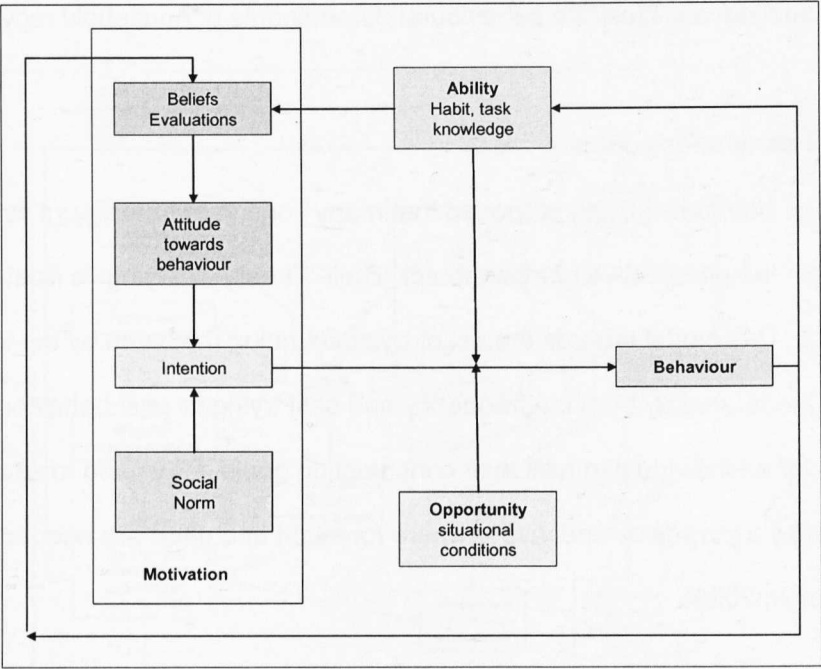
(Pc) of the behaviour. The S factor reflects the individual's internalization of the subjective culture of the reference group, which internalises the individual's perception of the social group. Subjective culture involves roles, norms and values that form the social factors that influence an individual's intention. This differs from the first relationship which was based on stimulation and has minor cognitive aspects whereas the second relationship is mostly cognitive-evaluative.

This makes individuals neither fully deliberative nor fully automatic. They are also neither fully autonomous nor entirely social with behaviour influenced by moral beliefs, with the impact of these being moderated both by emotional drivers and cognitive limitations. Triandis' Theory of Interpersonal Behaviour not only captures many of the criticisms levelled at rational choice theory but also provides a clear value in the conceptual sense. Its application to date has not been applied to an examination of environmental behaviour. However the TIB is an integrated model, which would justify its consideration for other applications of examination of behaviour including household recycling.

The Motivation-Opportunity-Abilities Model

Another well-known attempt to construct an integrative model for consumer action is the motivation-opportunity-abilities (MOA) model proposed, for example, by Thøgersen (1994). Thøgersen and other authors acknowledged that consistency between attitudes and behaviours could only be expected under conditions of volitional control. They pointed to the improvements in predictive power achievable by incorporating an 'ability' concept and a concept of facilitating conditions or 'opportunity' to perform the behaviour into the model (Figure 2.11).

Figure 2.11: The Motivation-Opportunity-Abilities Model (from Jackson, 2005)



The 'ability' concept is supposed to incorporate both a habit and a task knowledge element. Its inclusion in the model draws support from a variety of places, including previous research on waste separation and recycling behaviours (Kok and Siero 1985, Pieters 1989, 1991, Thøgersen 1994). The importance of 'habit' as a determinant of behaviour and as a moderator of intention was discussed previously in reviewing the Triandis (1977) theory of interpersonal behaviour. Task knowledge is also clearly an important consideration, particularly in relation to new procedures relevant to pro-environmental behaviour, such as the appropriate separation and sorting of recycling materials (Verhallen and Pieters 1984, Thøgersen 1994). The important structural feature of the MOA model is its attempt to integrate motivation, habitual and contextual factors into a single model of pro-environmental behaviour.

Other applications of the MOA framework include its use to describe attempts by households to reduce energy consumption (Gatersleben and Vlek, 2002). Although the MOA model was used by Thogerson (ibid) to design an intervention programme for source separation it incorporates many of the key behavioural determinants

reviewed earlier. In this regard it could be considered for use in this thesis to examine, analyse and illustrate behavioural determinants of household recycling.

Models of consumer action

Bagozzi and Warshaw (1990) proposed that many consumer behaviours could be studied from the perspective of trying to act. Their 'Theory of Trying' is illustrated in Figure 2.12. This model regards the act of trying as being mediated by the intention to try and moderated by both the frequency and past trying or past behaviour.

Therefore for an individual to fulfil their consumption goals, they need to see their own action as a purposive endeavour where foresight and effort are needed (Bagozzi et al, 2002).

Figure 2.12 Bagozzi and Warshaw Theory of Trying (from Jackson, 2005)

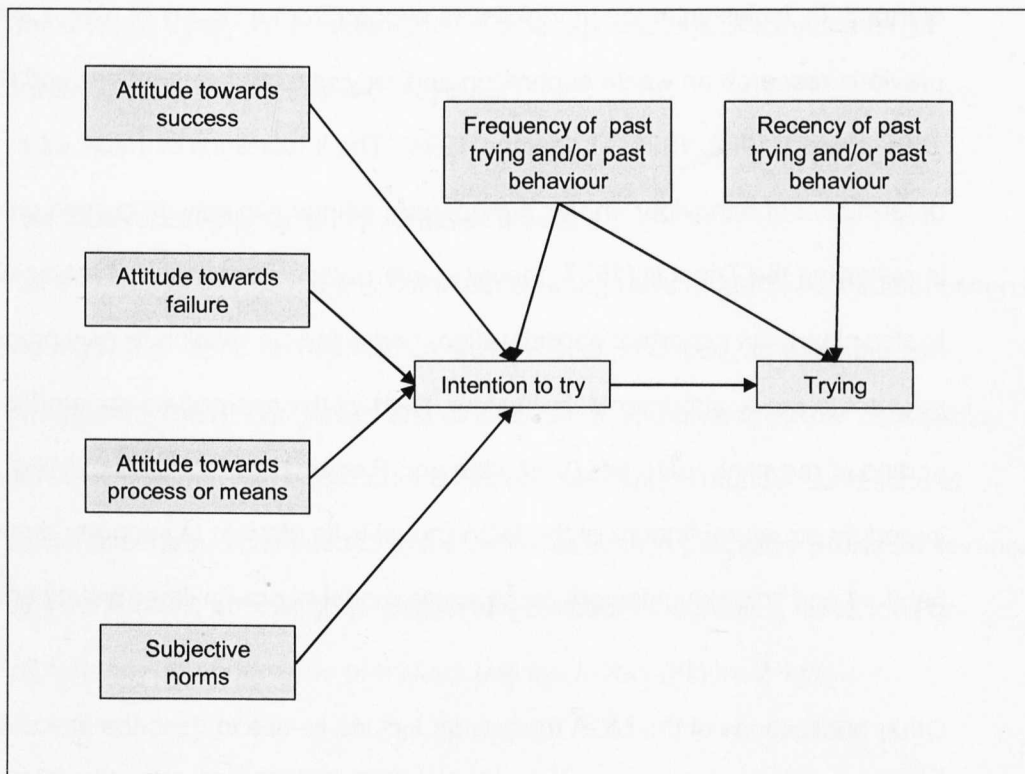
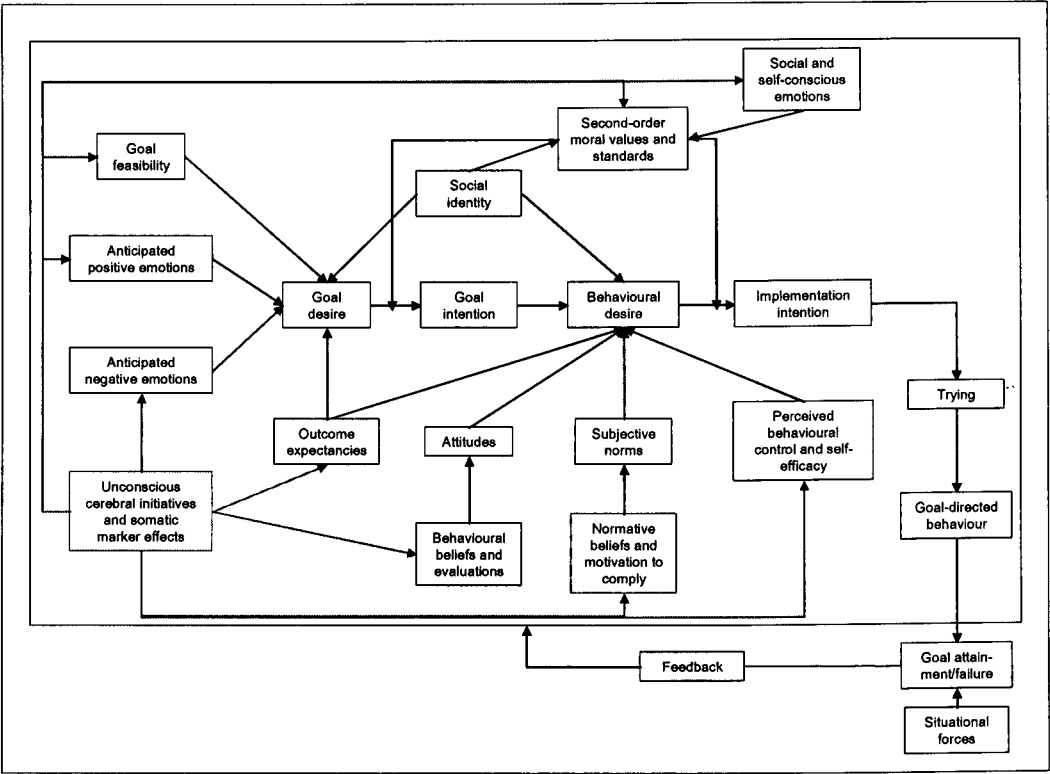


Figure 2.13: Comprehensive Model of Consumer Action (from Jackson, 2005)



The immediate antecedents of the intention to try, in Bagozzi and Warshaw's (1990) model appear similar to the Ajzen-Fishbein models, except that the Theory of Trying (ibid) distinguishes attitudes toward success explicitly from attitudes toward failure and attitudes about the process of trying itself. Bagozzi et al (2002) theory was also extended and elaborated into a more comprehensive model of goal-directed consumer action (Figure 2.13).

This model incorporates many of the kinds of variables from other models including affective, normative, habitual and social components. It also attempts to show how unconscious cerebral factors (shown in red) influence both emotional and deliberative decision-making processes.

2.4 Selection of a model to examine household recycling behaviour

Much research on household recycling behaviour has been undertaken using the Theory of Reasoned Action (TRA) and the Theory of Planned Behaviour (TPB) developed by Fishbein and Ajzen (1977), Ajzen and Madden (1986) and Ajzen (1991). Previous use of the TPB to describe behaviour (Conner and Armitage, 1998; Sparks and Guthrie, 1998; Terry et al, 1999; Tonglet et al, 2003; Fedaku and Kraft, 2002; Davies et al, 2006; Nigbur et al, 2010) and the TRA (Barr, 2000; Barr et al., 2001) observed that while these models provided a useful foundation to examine waste management behaviour there were a number of shortcomings associated with them. The TRA, according to Bagozzi (1992), draws strength in explaining behaviour due to it being intuitive and insightful and is one of the more popular models used to explain recycling behaviour. However the TRA is based exclusively on volitional behaviours (Ajzen and Fishbein, 1980) for which external factors not under volitional control may disrupt this process.

The TPB assists in explaining behaviours not completely under volitional control (Ajzen and Madden, 1986; Ajzen, 1987, 1991) and is a more suitable model to examine household recycling. However, previous research into household recycling resulted in the use of the TRA and TPB only capturing a small proportion (<30%) of the variance on analysis of the data (Conner and Armitage, 1998; Davies, 2000; Barr et al, 2001; Davies et al, 2002; Tonglet et al, 2004; Davis et al, 2006). It was suggested that to improve this situation additional variables be included within the models (Boldero, 1995; Barr et al, 2001, 2002; Davies et al, 2002; Tonglet et al, 2004). The TPB according to Ajzen (1991) allows for the incorporation of additional variables, provided they make a significant contribution to the explanation of behaviour. This approach was taken by Tonglet et al (2004) and Davis et al (2006) who included personal norms, past experience, situational factors, consequences

and self-identity in their research on recycling behaviour using the TPB. Davies (2001) and Davies et al (2002) also applied additional variables to the Schwartz (1977) model and the TRA in developing an integrated model to examine household recycling. Research by Davies (2001) and Davies et al (2002) in examination of multi-attribute models for recycling behaviour suggested that the TPB supersedes the TRA and that there is a case in favour of expanding the TPB to include an affective evaluation of behaviours that are emotionally charged, like recycling. Their findings also support the inclusion of personal norms in the measurement of behaviours, which include an element of moral correctness. Their research further suggested that when applying the TRA or the TPB to ethical or moral behaviour the inclusion of affect and personal norms significantly increases the predictability of the models. However, with regard to predicting recycling behaviour the TRA was rejected and the TPB providing limited support.

With regard to the assessment of the suitability of the Schwartz (1977) Model of Altruistic Behaviour, Davies (2001) and Davies et al (2002) suggested that personal norms and social norms directly influence behaviour and are not mediated by AR and AC and that AR and AC significantly predict personal norms when AR and AC are high. Therefore, based on these findings the probability of an individual internalizing the desire not to waste anything is high and likely to result in recycling behaviour. This contribution suggests that strategic initiatives should make a causal connection between human behaviour and the degradation of the environment, so that individuals will make the link between AR and AC and the need to minimize waste. The Schwartz (ibid) model was considered by Davies (ibid) to be more predictive of recycling behaviour than either the TRA or TPB and improved the classification of recyclers by a further 34% over the TRA and 5% over the TPB. Extension of the Schwartz model to include perceived behavioural control (PBC) and affect further increased the sufficiency of the Schwartz model.

In differentiating between the TRA/TPB and the TIB, Triandis (1980) identified three areas of importance. Firstly, with regard to the relationship of intention to behaviour, Triandis (1980) argued that the TRA simply states behaviour and is some function of behavioural intention, which excluded the important role played by habit and facilitating conditions. This is due to the observation that habit for many behaviours, is more important a criteria than intention with facilitating conditions often having a decisive role in reducing the predictability of behaviour from behavioural intention. Secondly, for social factors, the TRA (and later TPB) includes two aspects which are "what others want us to do" and "our beliefs" (Fishbein et al, 1975). Triandis' (1980) conceptualization refers to self-instructions to do what others consider appropriate behaviour, where 'others' considerations may be due to 'norms', 'roles' or 'interpersonal agreements'. He also included in his theory moral considerations associated with 'personal norms' or self-instruction to do what is morally appropriate.

Finally, the TRA conception of "attitude toward the act" considers all 'salient' beliefs the individual has regarding the act. However, the TIB links emotions or 'affect' to the act occurring at the moment of action, and 'beliefs' that link the act to future consequences. This provided a distinction between the "here and now" and "beliefs" that the future is important as some people live in the former dimension and use little or no time perspective whereas others live for the future. In this regard, the TRA/TPB would in its broad encompass of attitude (including consequences associated with the act and antecedents of the act) include 'all salient beliefs. An illustration of this from Triandis (ibid) is purchasing a house and, buying a cup of coffee would be placed in the same context in accordance with the principles of the TRA/TPB, which is clearly not the case as the former example has significant consequences.

Regarding the Schwartz model, Davies (2001) identified usefulness of the model in predicting recycling behaviour over that of the TRA/TPB and extended versions; however, the Schwarz model had additional components to make it a suitable

application for prediction of recycling behaviour. All of the elements in Davies' (ibid) extended Schwartz model are incorporated in the TIB plus additional components such as habit and situational factors (Facilitating Conditions). The extended versions of the TRA/TPB and Schwartz may, according to Bagozzi (1992), be able to accommodate ever-wider realms of social behaviour. However, there is a risk that the models will lose their parsimony and generality and that the structure of the model may increase haphazardly. This situation does not apply to the TIB model.

Regarding other models considered in this literature review, the Theory of Trying (ToT) model (Bagozzi and Warshaw, 1990) was developed to address the problem from the TPB based on whether action can be part volitional and non-volitional. However, the ToT conceives behaviour as a process of striving, with an example of this being weight loss and intention to exercise (Bagozzi and Warshaw, 1990). In this regard it is difficult to envisage the ToT being applied to household recycling behaviour, however, it may have uses for waste prevention and reuse. Based on these reasons this model and the later Comprehensive Model of Consumer Action (Bagozzi et al, 2002) both models are considered to be suited to consumer decision making based on goal directed action, which was not identified from a review of the determinants of household recycling. The MOA (Thogerson, 1994) appears to be a suitable model for behavioural determinants of recycling examination having already been used for examination of recycling behaviour. However, the TIB appears to cover most of the key determinants of recycling behaviour identified in the literature review. The TIB has not to date been deployed for examination of household recycling behaviour, which would provide a useful contribution to understanding of behavioural determinants in the context of recycling through its use.

2.4.1 Comparison of the TIB with other models to describe recycling behaviour

A comparison of the TIB with other behavioural models used for examination of household recycling was undertaken as a final stage to confirm the selection of this model for investigation into household recycling behaviour.

Expectancy-value models

Social Cognition or '*expectancy-value*' type models include the TRA and TPB plus expanded versions incorporated into conceptual frameworks by other researchers such as Barr et al (2001), Taylor and Todd (1995) and Tonglet et al (2004). Also included are other models incorporating normative applications such as the MOA (Thogerson, 1994, Olander and Thogerson, 2006) and the ABC model (Guagano et al, 1995).

Expanded Theory of Planned Behaviour (ETPB)

As discussed earlier in this Chapter, the TPB allows for the incorporation of additional variables. A conceptual framework based on an expanded TPB was undertaken in research conducted by Tonglet et al (2004) and by Davis et al (2006) to study determinants of recycling behaviour in Brixworth, Nottinghamshire and West Oxfordshire District Council (WODC) respectively. These exercises included the addition of personal norm, past experience, situational factors and consequences to the TPB model. The findings identified differences in subjective norm, which was strong in the WODC study and weak in the Brixworth study. Consequences of recycling displayed significance for the Brixworth area whereas outcomes of recycling showed a strong correlation in WODC. Situational factors were identified as being significant in WODC which was not the case for Brixworth. This was suggested to be due to WODC having an entirely different recycling service than Brixworth. All participants in the WODC survey had strong positive attitudes in favour of recycling,

however the '*intention-attitude*' relationship did not prove to be significant. The most significant finding from this research was concern for the community which comprised maintaining a good place to live and health and well-being of the community. This therefore may be a factor which triggers an intention to recycle for some, but not for others. If the TIB was used in the above surveys then similar results may have been obtained. However two key components '*habit*' and '*self-identity*' were absent from the ETPB.

Expanded Theory of Reasoned Action (ETRA)

Barr et al (2001) used the TRA for the development of a conceptual framework to illustrate the '*intention-behaviour*' link associated with waste recycling, waste reduction and waste reuse. The findings from this research were that all three activities had fundamentally different behaviours. They found reuse similar to reduction, which was undertaken least often, however recycling was identified as fundamentally different and norm based. Their use of the TRA as a conceptual framework provided a robust argument for the various predictors of the general behaviours. Barr et al (2001) suggested that the drivers associated with recycling activity compared with reduction and reuse were essentially logistical with having access to a structured kerbside facility, knowledge of how to use the service and perception that the service is easy to use was crucial for predicting behaviour (Barr et al, 2001).

Comparing the application of the ETRA with the TIB, the framework is fundamentally different with emphasis by Barr et al., (2001) on environmental values linking to behavioural intention and behaviour. Other influencing factors include situational variables (Facilitating Conditions in the TIB) as enablers and disablers and psychological variables as motivators and barriers. The social factors including subjective norms, citizenship and self-efficacy were included with other psychological variables as a combined cluster of components as opposed to being treated as

separate influencing groups as in the TIB. However absent from this conceptual framework based on an expanded TRA were '*habit*' (a central plank of the TIB) and '*affect*'. It is also questionable whether '*self-identity*' was included within this framework.

Taylor and Todd (1995) developed an integrated waste management model based on the TPB to understand the relationships between environmental beliefs, attitudes and behaviour. The expanded model by Taylor and Todd (1995) included '*perceived innovation*' (Rogers, 1983) facilitating conditions (Triandis, 1977, 1980) and '*self-efficacy*' (Bandura, 1977). The study found that intention to recycle was positively influenced by attitude but negatively influenced by subjective norms. Internal and external normative influences were important determinants with facilitating conditions positively related to behavioural control. The research suggested that recycling was not compatible with people's daily routine however given adequate knowledge they would be willing to overcome personal inconvenience. This model has the closest parallels with the TIB, however '*affect*' and '*habit*' were absent from the model.

Motivation Opportunities Ability (MOA) model

Thøgersen's (1994) work on the use of a theoretical framework to understand recycling behaviour in Danish recycling programmes schemes was designed to shed light on previously research into consumer behaviour. This was designed to examine what the consumers motives were for handling of used packaging such as newspapers and left-over's in their waste and what other factors beside motivation influence whether they recycled or not. The behavioural framework developed included three main determinants which were:

- ◆ The **motivation** of an individual to choose one or another alternative acts toward the target

- ♦ The **opportunity** to carry out the intention based on subjective (perceived control) and objective situational conditions.
- ♦ The **ability** to carry out the intention to perform the behaviour

Thogerson's (ibid) model provides a useful means to understand an individual's recycling behaviour, where motivational factors are captured as intention in a similar manner as that provided by the TRA (Fishbein and Ajzen, 1975; Ajzen, 1991). This transforms the factors associated with values, beliefs, norms and attitude into an intention to engage in behaviour. The other elements (ability and opportunity) provided a richer understanding of behaviour with ability based on Pieter's (1991) involving task knowledge, habit and the use of facilitating conditions (Triandis, 1977, 1980) respectively.

Regrettably the data quality from Thogerson's (ibid) research did not allow a proper test of the model. However in comparing the MOA with the TIB there are key components absent from the MOA which include '*self-identity*' '*personal norm*' and '*affect*'. In this regard a more appropriate version of the MOA would be an expanded TRA/TPB incorporated onto an MOA. However, these models are hybrids based on other models whereas the TIB is a single behavioural model.

ABC Model

Guagano et al's (1995) Attitude Behaviour Conditions (ABC) model posited that actions or behaviours were associated with attitudes. These attitudes range from extreme negative positions in which behaviour would only be performed under coercion to extreme positive positions associated with what a person would normally do. The model also posited that actions include external conditions including support sources or opposition to the behaviour, which may be legal, financial, social or physical. These were regarded as either '*barriers*' or '*enablers*' and relate to the

facilitating conditions in the TIB, MOA and expanded TRA/TPB frameworks. The ABC model postulated that there are distributions of A and C for any behaviour and the prevalence of the behaviour in the population will reflect those distributions. The focus of the research was to examine the difference between two types of recycling programmes, kerbside and drop off (bring site).

Schwartz model of altruistic behaviour

The Schwartz model (1977) was used to examine environmental attitudes based on awareness of perceived consequences (AC) and ascription of responsibility (AR). Guagano et al (1995) found that ascription of responsibility exerted a significant direct effect on recycling behaviour; however awareness of consequences or perceived personal costs did not impart an impact on behaviour per se but impacted significantly on the AC component. The overall findings from use of the Schwartz model were that it was effective at predicting behaviour for households without bins but had virtually no predictive value for kerbside collections. Guagano et al (ibid) recommended from his research to broaden both behavioural and attitude theory to allow for the concepts of external conditions in addition to the perception of external conditions. The Schwartz model was not used in the TIB framework; however it could have been deployed as improvement of the TIB model to provide an extension of the personal norm component.

In summary, comparing previous research on recycling behaviour using other models and variations on these models (TRA, TPB) with that of the TIB, it is proposed that the TIB provides a useful application for the investigation of household recycling. Based on the above review of the literature and personal choice the TIB was selected by the researcher for use in developing understanding of the determinants of household recycling behaviour. The key determinants of recycling behaviour identified from the literature are categorised under the TIB headings are illustrated in Table 2.3.

Table 2.3 Determinants from literature review in accordance with TIB

<p>Cognition</p> <ul style="list-style-type: none">◆ Perceived consequences of behaviour◆ Evaluation of consequences <p>Affect</p> <ul style="list-style-type: none">◆ Feelings toward performing a behaviour◆ Level of active concern <p>Social norms</p> <ul style="list-style-type: none">◆ Descriptive (What is done)◆ Prescriptive (What ought to be done) <p>Role</p> <ul style="list-style-type: none">◆ Sociological (normative and informational influences)◆ Citizenship factors (motivation to validate status in community) <p>Self-Identity</p> <ul style="list-style-type: none">◆ Importance of performing a behaviour based on self-concept◆ Cognitive dissonance	<p>Personal norms</p> <ul style="list-style-type: none">◆ Altruism◆ Awareness of consequences of individual actions (AC)◆ Ascription of personal responsibility (AR) <p>Intention</p> <ul style="list-style-type: none">◆ Intention to perform a behaviour based on cognition, affect, social and personal factors <p>Habit</p> <ul style="list-style-type: none">◆ Learned acts that become automatic responses <p>Facilitating Conditions</p> <ul style="list-style-type: none">◆ Logistics and convenience◆ Knowledge and awareness◆ Service design & reliability◆ Information◆ Infrastructure◆ Service provision
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2.5 Conclusions from literature review

A review of the literature on household recycling in this Chapter supports the findings from other researchers (Davies, 2001) that existing understanding of household recycling behaviour is fragmented and inconclusive. This is further compounded by a shortage of integrated behavioural models for investigation of household recycling behaviour. In addition, based on a review of behavioural models the most common application to household recycling behaviour is that of the TRA and TPB. However other models not currently used to examine household recycling may provide a better understanding of the interaction of behavioural determinants. In this regard the

model selected was the TIB which was developed around the same time as the TRA; however, for reasons unknown this was not applied to environmental topics other than IT applications. The review of literature identified that many of the determinants associated with recycling behaviour were included within the TIB providing an opportunity to test this as a potential future model. The selection of a study area for conducting research into the analysis and investigation of household recycling behaviour including the selection of research methods is provided in the next Chapter.

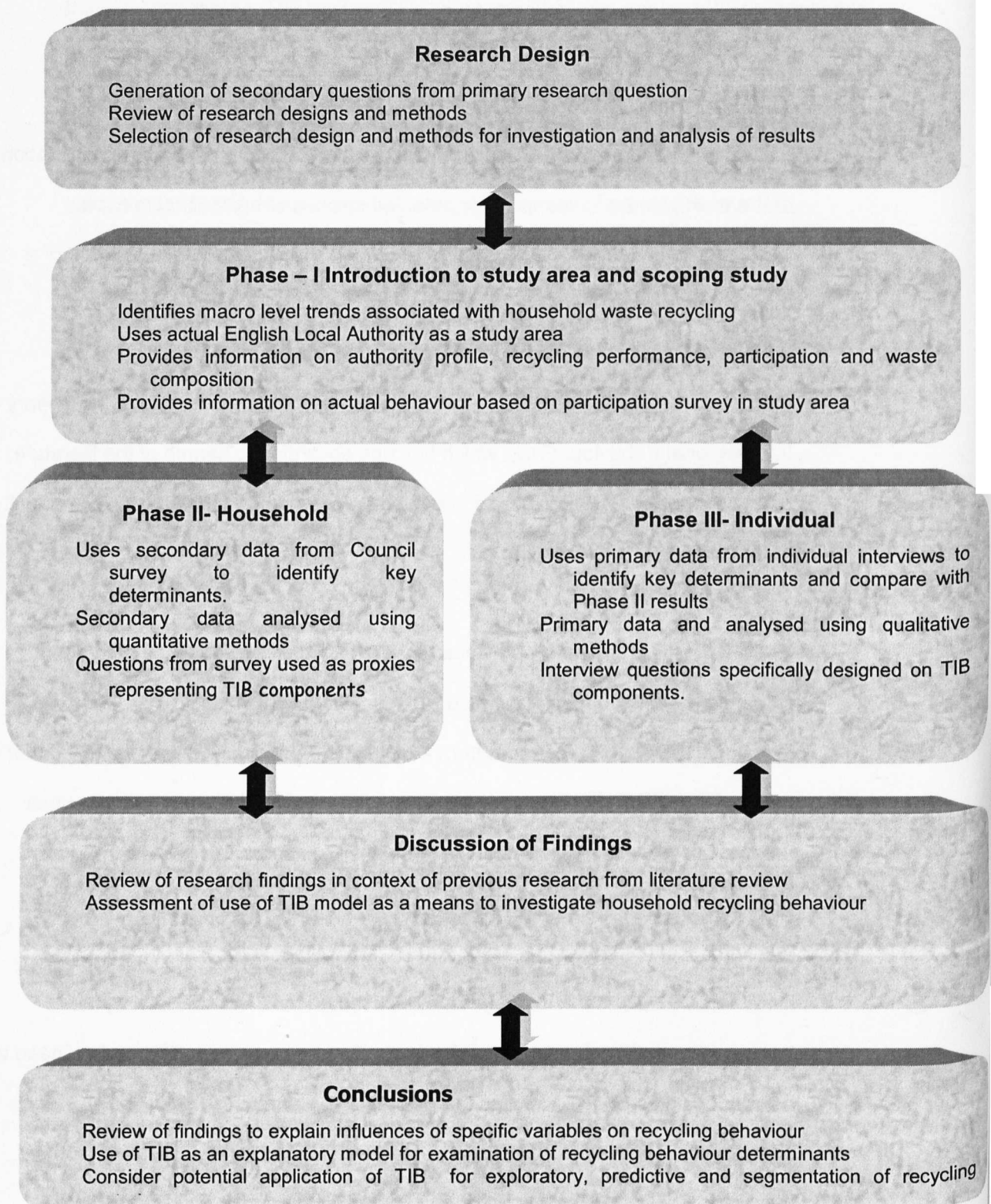
CHAPTER THREE: Research Design

3.1 Introduction to the chapter

This Chapter covers the selection of a research design and method for the investigation and analysis of household recycling behaviour plus a brief description of the work plan and a summary of potential errors and biases that may be encountered in analysis of the data. In reviewing research methods, the use of a mixed method was favoured due to its ability to provide breadth and depth of understanding of behavioural phenomena using combined quantitative and qualitative research approaches. The research also involves the use of the Theory of Interpersonal Behaviour (TIB), which has not, according to search of the literature, been used for the investigation of household recycling. This provides an opportunity to test the TIB in a new setting.

A review of the literature on previous research identified a variety of factors that influence recycling behaviour, which include psychological, sociological and situational factors. Furthermore from a modeling perspective, it was identified that many of the social-psychological models used to examine sustainable consumer behaviour assumed an individual (self-influencing) approach. However, human behaviour may be influenced by social and other factors in the environment in addition to self-influence (Jackson, 2005; Davies et al, 2002; Tonglet et al, 2004; Darnton, 2007, 2008). In this regard and, based on the literature review, the investigation and analysis of household recycling behaviour would therefore need to be conducted at the collective-social level as well as at the individual level. Taking the above findings into consideration, the investigation and analysis of household recycling behaviour associated with this thesis will therefore incorporate in its approach a collective-social and individual dimension. The framework, designed by the researcher, which guided this research programme, is shown in Figure 3.1.

Figure 3.1 Framework for research programme



3.1.1 Research programme and development of aims and objectives

Using the information gained from a review of the literature on household recycling and on the use of behavioural models, the research question was divided into aims and objectives, in order to refine the issues under investigation (Bloom, 1956, Anderson and Krathwohl 2001). The key determinants of household recycling behaviour identified from the literature review are categorized under the TIB headings as set out in Table 2.3 from Chapter 2. The aims and objectives were also designed for testing of the TIB as a suitable model for investigation and analysis of household recycling behaviour and are listed as follows:

Aims

To evaluate the TIB as a model for investigation and analysis of household waste recycling behaviour.

Objectives

1. To evaluate how preference influences the determinants of household waste recycling behaviour.
2. To identify the key determinants using the TIB that influence household waste recycling behaviour.
3. To evaluate how the social and attitude components in the TIB influence household waste recycling behaviour.
4. To evaluate how intention to recycle and habit influence household waste recycling behaviour.
5. To evaluate how facilitating conditions influence household waste recycling behaviour and behavioural intention.
6. To identify the key determinants using the TIB that may inhibit household waste recycling behaviour.

3.2 Development of Research Framework

A key stage in the process was the selection of a study area in which to conduct the research. This was followed by the selection of a research design in which the collection and analysis of data by the researcher was undertaken and method(s) in which the analysis of data was conducted.

3.2.1 Selection of study area and research design

The researcher selected the Royal Borough of Windsor and Maidenhead (RBWM) Council as the study area in which the research was to be undertaken. This local authority was selected as the researcher was employed as a senior officer with RBWM, responsible for the waste management service. This provided the researcher with unlimited access to Council data which is not normally available to an external researcher. The researcher was also directly involved in the development of Council surveys and reports. The information from these Council surveys and reports include data on waste arisings (including recycling tonnages), residents' opinions on service satisfaction, expectation and, claimed usage of services. Specialist reports on waste composition and participation in recycling programmes were also included in the data selected. This information is covered in more detail in Chapter 4 and provides a useful source of data for linking to the TIB.

These TIB linkages include 'facilitating conditions' and social norms which are used along with other data to test the suitability of TIB as a model to investigate household recycling behaviour. To illustrate this last point, a key source of information was a survey by RBWM on recycling and composting behaviour, which was designed to identify perceived beliefs with regard to convenience of the service, knowledge gaps and claimed levels of behaviour regarding use of the service. This survey, which is covered in detail in Chapters 5 and 6, was designed and implemented by the researcher in his practitioner capacity (Council Officer), and was used as a means for the collection of data to test the TIB.

A review of possible research designs considered by the researcher, from Bryman, (2004, p29), provided a means for selecting a framework for the investigation of household recycling behaviour and to test the suitability of the TIB. Research designs included a) cross-sectional, b) experimental, c) comparative d) longitudinal and, e) case- study.

The 'cross-sectional research design' according to Bryman (2004, p41):

"Entails the collection of data on more than one case and at a single point in time to collect a body of quantifiable data in connection with two or more variables which are examined to identify patterns of association".

The cross-sectional research design was selected by the researcher as a suitable approach for testing the TIB as:

- ◆ The TIB contains more than two variables;
- ◆ The data on claimed behaviour is collected during a single point in time from a sample of residents, from the study area;

Other research designs were considered and eliminated based on the following criteria:

- ◆ *Experimental research design* was considered inappropriate as the methods for investigating household recycling behaviour in the study area involve large samples in which the social setting for the research would not allow manipulation of independent variables.

- ◆ *Comparative research design* was considered inappropriate as stated in section 1.4.2 of Chapter 1 the aim of the research was to investigate determinants of recycling behavior and not to develop a waste service. Cross-cultural influences may be an important element of comparative research; however, they are not considered an important element for this study.

- ◆ *Longitudinal research design* was not selected as the research for this thesis involves collection of data via questionnaires and interviews at a single point in time. The use of secondary data made it difficult to follow up in a similar vein however a small longitudinal aspect included use of a pre-questionnaire as a precursor to household interviews. Information from Council reports on waste composition, recycling performance and satisfaction surveys also provide longitudinal information which may be used to support the findings from the research.

- ◆ *Case study research design* was considered inappropriate as the research to be undertaken was concerned with recycling behaviour for which this behaviour is not specific to RBWM. In this regard RBWM is used as a study area in which the research is conducted. This is different to a case study which provides a specific focus on the research to an area.

3.2.2 Collection of data

Data collected for the research was obtained from a variety of sources by the researcher in his capacity as a waste management practitioner, which provided access to a significant volume of information. This resulted in the researcher being able to collect large amounts of verifiable and audited data for an effective scoping of the study area. Examples of this data include recycling percentages and national and

regional statistics on recycling for comparison of performance with other local authorities of similar size. All of the information collected is not commercially sensitive in accordance with information governance and Freedom of Information Act (FOI) 2000 requirements. This includes a household kerbside recycling participation survey undertaken, by the researcher for the Council. This participation survey measured 'actual' (versus claimed) behaviour in accordance with how frequently households set out their kerbside collected waste for recycling. The sample size for household recycling participation surveys is significant as it is based on a kerbside collection round which in the case of the study area includes 7,000 properties. This from a property base of 60,000 (population 133,000) is also statistically significant in terms of sample size. Details of the scoping information including results of the household recycling participation survey are provided in Chapter 4.

A useful source of information includes that from a Council conducted survey in 2005 on opinions and expectations of RBWM residents and claimed use of services including household recycling. However, due to the subject areas in the Council's Opinion survey being wide-ranging (street-care, crime and disorder, waste) the data from the survey was limited in its ability to enable a useful examination of the determinants of recycling behaviour. To address the limitations of the Opinion survey, a survey which collected information on claimed behaviour specifically toward household recycling was later undertaken in March 2006. The data from this claimed behaviour survey, which was designed by the researcher for the Council in his waste practitioner capacity, was used to investigate determinants of household recycling behaviour and to test the suitability of the TIB. As personal information was included on the survey questionnaire, an independent consulting company, Bostock Marketing Group (BMG), was retained for recruitment of the survey panel design of survey questions in collaboration with the researcher, collection and collation of data. The data collected also included personal information which is regulated under the Data Protection Act 1998, for which compliance is a statutory requirement.

The 2006 survey (RBWM, 2006), was issued by post to a panel of approximately 1,040 volunteers recruited by BMG and included 40 sets of questions. Each set of questions were either multiple selection (check each response that applies), dichotomous (Yes/No) or scaled (check one box which applies). This latter category used mostly 5-point scales in which respondents rated their preference from “strongly agree” to “strongly disagree”, as an example. These questions provide ‘ordinal’ data, which was used to test reliability and replicability of the results, which are later reviewed in this Chapter. The results from a household recycling participation survey, designed by the researcher, representing ‘actual behaviour’, were also compared with that of the ‘claimed behaviour’ survey. This provided a means to identify indicators of false reporting or over/under claiming of behaviour from the respondents. Analysis of the data from the 2006 survey (RBWM, 2006) and comparison of claimed versus actual behaviour is provided in Chapters 5 and 6.

Claimed behaviour was also measured from an individual as well as a household perspective. Patterns of claimed behaviour from an individual perspective may be observed by conducting individual interviews with householders. This activity, carried out by the researcher (in his researcher capacity) in 2009, involved a series of semi-structured interviews. The interview questions were designed specifically with the TIB in mind, whereas the 2006 claimed behaviour questionnaire was not. Therefore, to represent the TIB components, specific questions from the 2006 survey were extracted from the postal questionnaire for use as proxies.

The analysis of the interview data was qualitative, based on the verbal (as opposed to numerical) responses from semi-structured interviews. The questions for the household interviews were also designed so that coding of the data can be undertaken on a ‘thematic’ basis¹⁶ (Braun and Clarke, 2010) using the household

¹⁶ The approach to the analysis was considered thematic in that the project is the ‘data

interview questions as codes for each respective element of the TIB. A limitation however is the sample of interviewees is comparatively small compared to the household survey sample (8 versus 500). However it was considered impractical (if at all possible) for the purposes of this research to use a similar sample size for conducting interviews. The analysis of the interview data is provided in Chapter 7.

3.2.3 Research methods

Following the selection of a research design, a research method was needed that would enable data collected from the study area and a variety of other sources to be analyzed.

In reviewing research methods a number of researchers (de Vaus, 2001; Creswell 1994; Black, 1993; Layder, 1993; Lewins, 1994; Bryman, 1988; Mann, 1985; Rose, 1984) identified quantitative and qualitative methods as two mutually exclusive research traditions representing different epistemological positions. Inference was on the distinction between '*theory-testing*' and '*theory-generating*'. Theory-testing uses deductive reasoning to formulate a conceptual set of questions or 'hypotheses'¹⁷ that are empirically tested through observation and are typically associated with quantitative methods. Theory-generation however, is the converse of theory-testing and commences empirically using inductive reasoning to derive a theory and is typically associated with qualitative methods. Arguments to the above selection process are mixed with De Vaus (2001) suggesting allocating a particular method to a particular research position is erroneous. In reviewing the quantitative-qualitative debate Slater and Frederickson (2002) used the concept that either research methodology may be effectively used for confirmatory or for exploratory research. They identified that to provide effective answers to the research question and sub-

corpus', the interviews (including pre-interview questionnaire based on the 2006 survey) the 'data sets' and the individual questions from the household interviews the 'data items'

¹⁷ Proposed explanation for an observed relationship between events

questions, on meeting the targets for the UK composting industry, would require quantitative and qualitative evidence, combined with descriptive, exploratory and explanatory elements. This is termed a multi-strategy research or 'mixed methods' (Bryman, 2004). A benefit of the mixed-methods research approach is it combines qualitative and quantitative analysis research approaches for the purposes of breadth and depth of understanding and corroboration (Johnson et al, 2007; Tashakkori et al, 2010).

Therefore taking the above arguments into consideration, for the purposes of this research thesis, it was decided by the researcher that a mixed method would be deployed. However, as identified previously when selecting a research design, there are a variety of mixed method structures or 'classifications'. These are discussed in the following section.

Mixed methods

Variations of mixed-methods from Tashakkori et al (2010 pp 305- 308) include:

- 1 *Triangulation* – convergence and corroboration of results from different methods studying the same phenomenon (from Hammersley, 1996).
- 2 *Facilitation* - where one research strategy is used to aid the other strategy (from Hammersley, 1996).
- 3 *Complementarity* – seeking elaboration, enhancement, illustration and clarification of results from one method with results from another method (from Hammersley, 1996).
- 4 *Development* – using the results from one method to inform the other (from Greene et al., 1989)
- 5 *Initiation*- discovery of paradoxes and contradictions that lead to a reforming of the research question (from Greene et al, 1989)

6 *Expansion* – seeking to expand the breadth and range of enquiry by using different methods for different inquiry components (from Greene et al, 1989)

From a method perspective, this research thesis for investigation of household recycling behaviour involved the use of:

- a) A quantitative method to analyse responses from households using questions from the survey as proxies to represent TIB and;
- b) A qualitative method to analyse responses from semi-structured interviews using questions based on the TIB.

The results from these analyses were compared to identify differences or similarities with each research method used for corroboration of the findings from the other research method. Each method was also used to investigate household recycling from a different perspective i.e., use of proxies to represent TIB and, use of interviews, with interview questions based on TIB components. Based on the above classifications of mixed methods the 'complementarity' method provided the best match.

3.2.4 Errors and biases that may be encountered in the research

According to Bryman (2004), errors and biases are encountered when undertaking research, in particular when the use of human subjects is deployed in natural settings. The main criteria for dealing with errors and biases include 'Reliability', 'Replicability' and 'Validity'. These are discussed briefly in terms of how they may impact upon the selected design for each respective research method.

Reliability: is a measure of the repeatability of the results of a study. It is addressed via two components which are '*stability*' and '*internal reliability*'. The former

component seeks to identify whether the measure is stable over time. This would apply to whether the responses to the 2006 survey could be considered to be applicable in a later survey. In order to test reliability the questions used as proxies for the 2006 claimed behaviour survey (RBWM, 2006) may be repeated as a pre-interview exercise. This may provide some degree of assurance with regard to stability in terms of variation of responses. With regard to 'internal reliability' this relates to whether the scores on an indicator or question concerning a particular component under examination are related to their scores on the other indicators. One means of addressing this is the use of the 'Chronbach (1951) alpha' test of internal reliability.

Replicability: is the measure of replication of the findings by others and is largely dependent on the detail of the procedures used to measure a component. For the 2006 survey and 2009 pre-interview the methods of examination are clearly set out and would be expected to exhibit a high degree of replicability. For the 2009 interviews, the questions were semi-structured, which assist in the repeatability of the process by another researcher even if the research does not end up being replicated. Anonymised data from the 2006 Claimed Behaviour survey (RBWM, 2006) may be obtained by writing to RBWM at:

Royal Borough of Windsor and Maidenhead

Town Hall, St Ives Road, Maidenhead

Berkshire, SL6 1DD

Internal validity: is the measure of the extent of inference that an observed relationship between independent and dependent variables reflects causation. The use of a control group assists in enhancing demonstration of internal validity, however control groups were not used by the researcher and internal validity would

be considered as relatively weak and association based rather than causal inferences.

Construct validity: From Bryman (2004 pp. 72-75) refers to the assumption that both independent and dependent variables adequately capture the variables they are supposed to represent. This is particularly the case with the secondary data from the 2006 survey and 2009 pre-interview as the questions are proxies representing the TIB components. In this case, there is an emphasis on interpretation of the questions as to whether they adequately represent the component variables of the TIB.

With regard to threats to the construct validity of dependent variables and whether it is measuring what it is supposed to, potential errors and biases include social desirability, demand characteristics and, experimenter expectancy, which are described briefly:

◆ **Social Desirability**

Social desirability is a phenomenon that occurs because participants are keen to be seen in a positive-light in terms of their responses to the questions asked and may express reluctance to report their negative qualities and fears. In terms of this research, this pertains to over-claiming and a measure to assess this phenomenon is to compare the findings of claimed behaviour with that of actual behaviour from a kerbside recycling participation survey. Over claiming is commonly encountered in surveys of this nature (Woollam et al, 2003) and the assessment of this is discussed in Chapter 5.

◆ **Demand Characteristics**

Demand characteristics are cues in the experimental setting that convey to the participant the nature of the research and how they will be expected to behave in accordance with satisfying the outcome. Participants may then

attempt to provide the expected responses in order to fulfil the researchers' expectations. A means to minimize demand characteristics is to provide participants with prior information on why the survey/interview is being conducted in broad terms (improve Council services etc.).

♦ **Experimenter Expectancy**

Experimenter expectancy is associated with the researcher's own expectations regarding the outcome of the research. This may influence the researcher's behaviour toward participants, potentially favouring the likelihood of a particular outcome. Measures to combat this include minimizing the interaction between researcher and participant.

External Validity

External validity is the extent to which the causal relationship between the variables can be generalized beyond the particular circumstances of the experiment. In this regard if the research was not externally valid it would only apply to the participants from the RBWM surveys and no other groups. The data collected on RBWM was therefore used to determine whether the study area was not atypical of a South East England local authority and to address external validity. In other-words, whether the findings from analysis of data on the authority may be generalized to other local authorities.

3.2.5 Secondary versus primary data

The measurement of actual behaviour and the provision of supporting information for the study area provide secondary data, which may be used to 'set the scene' in terms of the scoping of the study area. The measurement of claimed behaviour involves the secondary and primary data based on a household survey developed from a volunteer panel and undertaken by the Council (RBWM) and, individual interviews conducted at the participant's property by the researcher, respectively.

Secondary data is provided from the 2006 Council survey on waste management behaviour and involves the use of a quantitative method for data analysis. Primary data is provided from the researcher conducted household interviews in 2009¹⁸ and involves the use of a qualitative method. For the 2006 survey the questions are not designed with TIB in mind, which require extraction of specific questions for use as proxies representing the TIB components. The semi-structured interviews are however designed specifically on the TIB enabling all of the TIB components to be represented.

An advantage of secondary data in this research is the relatively large sample number of respondents (>1,000), which represents approximately 1% of the population of the study area. This also enables the selection from the main sample of sub-samples according to behavioural preference or type which may be used for comparative analysis of behavioural determinants between each respective sub sample.

In terms of comparison of the effectiveness of the mixed method approach the results from the qualitative analysis of the primary data from the household interviews may be used to support the findings from the results of the quantitative analysis of secondary data from the claimed behaviour survey. However, being appreciative of the 3-year gap between the survey and interviews a pre-interview questionnaire is used to identify if there are any significant changes from the original responses. This pre-interview uses the questions used as proxies representing TIB components from the 2006 questionnaire.

¹⁸ Includes pre-interview survey on interviewees using questions from 2006 survey

3.3 Research Work Plan

Following the selection of a research design and method, the next stage involves design of a work plan. This work plan was conducted in three phases, which are summarised in the following sections and covered in greater detail in Chapters 4 to 7.

3.3.1 Phase I: Scoping of study area

The initial stages of this phase included conducting a baseline review of current recycling statistics, profile of the study area and assessment of the overall performance of the waste and recycling service in the study area. This is compared with similar statistics on recycling from other local authorities and regional, national statistics and is covered in Chapter 4. The methods used in the collection of claimed behaviour regarding attitudes, norms, habits is different to that used for the recycling performance data as it claimed behaviour is associated with '*human activity systems*'. The process involves collection of 'subjective' information which is different to 'factual' data based on recycling performance and tonnages. This is not to say however, that the performance information does not bear any relationship to that associated with the claimed behaviour data.

3.3.2 Phase II: Claimed behaviour - households

Phase II involved the collection of behavioural information at household level. This includes data collected by the researcher from Council initiated surveys on claimed behaviour to identify underlying attitudes, beliefs and behaviours concerning the environment, waste and recycling. The findings from the claimed behaviour survey conducted in 2006 are used for comparison with actual behaviour observations from the household kerbside recycling participation survey conducted in 2006.

Comparison of claimed and actual behaviour

The information obtained from Borough-wide and neighbourhood level claimed behaviour was used to design the work plan for the final phase III in which recycling behaviour is examined from an individual perspective. The analysis of findings from phase II and its relationships with the broader data is set out in Chapter 5. Detailed statistical analysis and modelling is included in Chapters 6 and 7.

3.3.3 Phase III: Claimed Behaviour -Individual

The final stage of the work plan examined the decision-making process by individuals within the household and relationships/influences on behaviour toward household recycling. The results from phase III were used to identify trends and commonalities established from Phase II of the research programme. This phase of the research was conducted in 2009 and involved a series of semi-structured interviews, with householders who participated in the Council's 2006 Claimed Behaviour survey.

The next Chapter provides an introduction to the study area and provides an indication of overall performance regarding household recycling, services provided and its characteristics in comparison with other English local authorities of similar size in the South East of England. This provides a rich source of information for clarification, illustration and enhancement of the observations from the later phases of the research and how TIB may be used to illustrate these relationships.

CHAPTER FOUR: Phase I – Scoping of the study area and collection of baseline data

4.1 Introduction to the chapter

This Chapter provides an introduction to the study area in terms of its geographical area, size of population, recycling performance and services provided. This information is compared with statistics from other local authorities to demonstrate whether the study area is atypical of a South East English local authority or not. This provides a means as to whether the results from the investigation of household recycling behaviour in the study area using the TIB as model can be applied to other local authorities. This Chapter therefore provides a scoping of the study area and represents Phase I of the Work Plan (see Section 3. 3.3), which includes information on actual behaviour for comparison with claimed behaviour examined in Phases II and III.

4.2 Introduction to the study area

The Royal Borough of Windsor and Maidenhead (RBWM) is situated approximately 25 miles west of London, England with a population of c. 133,600 and is administered by the Royal Borough of Windsor and Maidenhead Council (the Council). RBWM covers a total area of 19,844 hectares or 79.4 square miles. Eighty three percent of the area is designated Metropolitan Green Belt including 1,000 acres of National Trust land and 4,800 acres Crown land. The population of RBWM is concentrated in two urban centres, which are the towns of Windsor (c. 30,000) and Maidenhead (c. 65,000). The main economic centres in RBWM include Windsor, Maidenhead and Ascot, which are surrounded by fourteen (14) villages, linked by the River Thames. RBWM achieved Unitary Authority status in April 1998 placing responsibility for both waste collection and waste disposal under its jurisdiction. The towns of Maidenhead and Windsor contain approximately 35% and 25% of the total

population of the Borough respectively. RBWM also contains a number of parishes, referred to as Northern and Southern. Further information on RBWM including services, population statistics and Council activities can be accessed via www.rbwm.gov.uk

4.2.1 Waste arisings in RBWM

Households in RBWM generate about 70,000 tonnes of Waste each year from approximately 58,000 domestic properties (about 1.37 tonnes per household). Table 4.1 illustrates the pattern of waste arisings from 2004/05 to 2008/09.

Table 4.1 Household waste tonnage RBWM 2004/05 to 2008/09

Category	2004/05 tonnes	2005/06 tonnes	2006/07 tonnes	2007/08 tonnes	2008/09 tonnes ¹⁹
Household Refuse	42,340	41,845	38,783	36,995	37,250
Street Sweepings	3,069	3,444	3,488	2,946	2,760
HRC Residual	9,411	4,738	4,326	4,543	5,700
Residual Waste to disposal	54,820	50,027	46,597	44,484	45,710
Kerbside Recycling	8,224	13,098	15,022	14,610	13,840
Bring Sites	2,618				
HRC Recycling ²⁰	3,754	1,448	2,128	1,605	1,170
Green Waste	5,188	5,482	6,025	6,893	8,920
Total Household Waste	74,604	70,055	69,772	67,521	69,640
Dry Recycling (tpa)	14,596	14,546	17,150	16,215	15,010
Dry recycling (%)	20%	21%	25%	24%	22%
Recycling & composting (tpa)	19,784	20,028	23,175	23,037	23,930
Recycling & composting (%)	27%	29%	33%	34%	34%

¹⁹ Projected annual estimate for 2008/09

²⁰ Includes waste tonnages delivered to Slough HRC

4.2.2 Waste Recycling Services

Approximately 58,000 households in the RBWM are served by a weekly kerbside recycling service. Up to November 2005, kerbside recycling included the collection of mixed paper, card, cans (ferrous and non-ferrous) and plastic bottles, which was collected weekly in a single 55L recycling box. A new collection and facilities management contract was let in March 2005 which provided a number of service improvements. These include the introduction of purpose built split-back collection freighters illustrated on the left-hand side of Plate 4.1, for collection of paper and card in one side of the vehicle and mixed glass, cans and plastic bottles (container stream) in the other side. The paper and card is processed at a local pulp mill and the container stream is delivered to a Materials Recycling Facility (MRF) for separation. The vehicle on the right-hand side of Plate 4.1 is for collection of residual waste, which provides a visible reminder to residents which vehicle collects which material. This colour coded vehicle scheme together with an intensive marketing and communications campaign was part of a Council service branding strategy to educate residents as to the benefits of recycling and improve knowledge and awareness. Knowledge and awareness are also part of facilitating conditions in the TIB and will be discussed later in the Chapter.

Plate 4.1: Refuse & recycling vehicles post March 2005

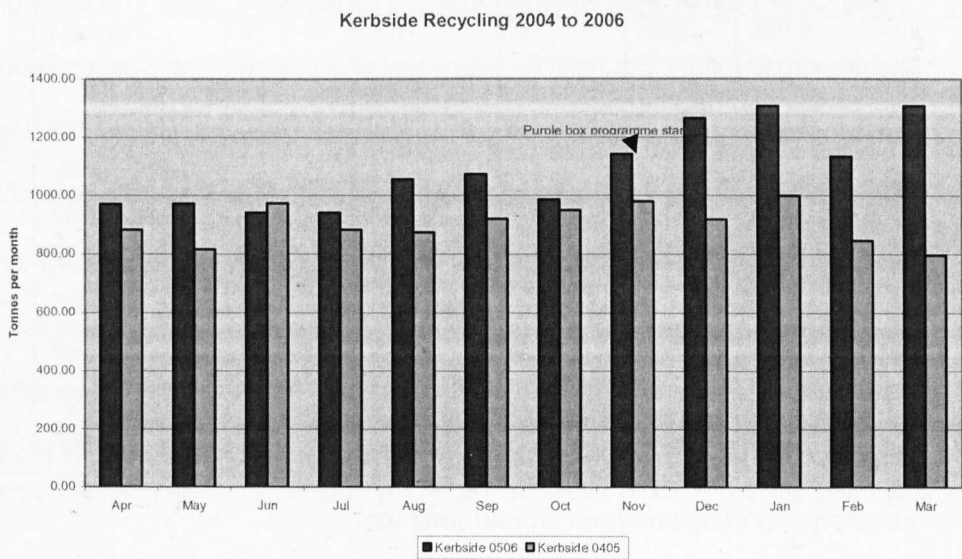


4.2.3 Performance of recycling and composting

All information on recycling performance and comparison with other local authorities and Regions was prepared by the researcher in his waste practitioner capacity.

Table 4.1 shows a steady decrease in residual waste of approximately 10,000 tonnes annually from 2004/05 to 2008/09. Dry recycling, which includes mixed paper, cans, plastic bottles and mixed glass, increased during this period from 20% in 2004/05 to 25% in 2006/07. This increase may be attributed to the service improvements on kerbside collection as described previously and modernisation of bring sites and household recycling centres (HRC). Figure 4.1 illustrates the impact of the new recycling service on overall recycling percentages compared with the previous year's results. Figure 4.1 illustrates the specific impact at kerbside collection level for dry recycling regarding the new services. The above tonnage increase in kerbside collected dry recyclables represents up to 10% increase on the previous years kerbside recycling levels as a percentage of total recycling collected. Other services for recycling include an appointment-based free of charge service for the collection of garden waste and a fee paying collection service for fridges and freezers.

Figure 4.1: Kerbside Recycling levels 2004 to 2006



In addition to this service, there is a network of 38 Bring Sites across the borough and an HRC which receive a wide variety of recyclable materials. Household hazardous waste including paints, oils, solvents, white goods, fridges/freezers, gas bottles, small quantities of bonded asbestos, scrap metal, and general household refuse is received at the Borough's HRC. Recycling tonnages from 2006/07 to 2008/09 show a major increase in garden waste recycling of approximately 3,000 tonnes. This increase may be attributed to another major service change in early 2008 involving the introduction of a subscribed chargeable kerbside garden waste collection service. Prior to 2008 garden waste was received at the HRC sites and collected from properties on appointment on a bulk basis with the HRC service yielding the largest tonnage. Figures for RBWM for the period 2009/10 suggest that garden waste recycling figures are in excess of 10,000 tonnes.

4.2.4 Comparison of study area with other Local Authorities

Not all councils are exclusively waste disposal authorities meaning it is, therefore, not always possible to compare over a broad range and, in some cases a smaller sample size must be considered. Groups of comparative authorities based on type, size, population and methods of service and historical trend include the Audit Commission Family Group, ONS Classification of Local Authorities of Great Britain 1999, CIPFA family and, Neighbouring Berkshire Authorities. The latter group includes the Unitary Councils formerly comprising Berkshire County Council which was abolished in 1998. At the time of collection of the data the primary focus for comparison was the nationally calculated statutory Best Value Performance Indicators (BVPI) relating to waste as defined in '*Guidance on Best Value performance indicators for 2005/06*' (Audit Commission, 2006). Table 4.2 illustrates performance against BVPI for 2002/03 extracted from the Best Value performance report for the service for all comparator families in which BVPI 82a is the indicator for statutory reporting on recycling performance.

Table 4.2 Family group comparison BVPI (2002/03) and NI (2008/09)

	Council	BV82a Recycling	BV82b Composting	BV82c Recovery	BV82d Landfill	BV84 Kg/hd/yr	NI 192	NI193
Berkshire	Bracknell	12.4	5.4	0	82.3	511.0	34.55	56.34
	Reading	11.0	3.3	0	85.8	509.0	34.55	64.75
	Slough	9.1	3.8	0	87.1	557.3	25.68	76.37
	West Berkshire	10.8	1.8	0	87.4	560.0	33.81	65.61
	Wokingham	16.6	7.0	0	76.4	474.7	36.74	60.36
	RBWM	16.9	5.8	0	77.3	656	36.10	62.79
	Average – Berks	12.8	4.52	0	82.7	544.6	33.57	64.37
ONS	East Herts	12.0	1.0	X	X	399.0	34.89	X
	Guildford	14.8	2.4	X	X	367.0	40.63	X
	Horsham	14.1	0.2	X	X	363.0	41.34	X
	South Oxford	19.90	0	X	X	390.0	42.80	X
	Average – ONS	15.2	0.9	X	X	379.8	39.92	X
CIPFA	Barnet	10.8	1.3	X	X	462.7	31.18	X
	Bexley	16.0	6.0	4.0	74.0	502.0	50.65	43.57
	Bromley	14.7	0.7	21.8	62.8	512.6	36.36	40.80
	Croydon	11.5	1.6	0	86.9	359.0	27.71	71.83
	Harrow	9.4	0	0	90.6	457.0	43.11	X
	Havering	5.9	0.8	X	X	520.0	27.40	X
	Hillingdon	13.4	6.1	X	X	523.4	35.32	X
	Kingston Upon Thames	14.2	4.8	0	80.9	505.9	30.21	X
	Merton	12.2	2.8	0	85.0	403.6	30.37	72.11
	Redbridge	7.4	2.6	X	X	464.8	26.25	X
	Richmond Upon Thames	16.7	3.8	0	79.5	516.6	41.73	X
	Solihull	7.6	0	66.6	25.8	446.5	32.87	17.53
	Average – CIPFA	11.7	2.5	7.7	73.2	472.8	34.43	49.17
	Total Average	12.96	2.55	3.85	78.5	458.3	35.98	56.77
	RBWM	16.9	5.8	0	77.3	656	36.10	62.79

Note: NI 192 =% recycling & composting & reuse (household); NI 193 = % landfill (municipal)

The BVPI system was replaced in 2007/08 with a new National Indicator (NI) scheme (DCLG, 2007) for statutory reporting. This new scheme saw the removal of many BVPI indicators and for recycling the old BVPI 82a + BVPI 82b and BVPI 82d became NI 192 and NI 193 respectively. BVPI 84 was replaced with NI191 which is total residual waste per household and was designed to represent growth of residual waste not total waste as in BVPI 82. The statistics for 2008/09 based on NI 192 and 193 are also included in Table 4.2 as a comparator of current performance

4.2.5 Comparison with National and Regional statistics

A review of performance of RBWM in terms of household recycling using BVPI in comparison with other local authorities suggest that RBWM is among the higher performing local authorities. However, this information was based on 2002/03 data. Comparison of RBWM recycling and composting performance in accordance with NI192 for 2008/09 still places RBWM among the highest performing of the Berkshire Unitaries, however recycling performance is lower than the ONS and some of the CIPFA Councils. Comparison of RBWM recycling and composting performance with national and regional statistics is provided in Table 4.3. From Table 4.3, it appears that RBWM is above the national average for recycling and composting and is similar to the average for the South East England Region up to 2006/07. However RBWM recycling and composting performance drops below the national average and the South East from 2007/08 to 2008/09. This drop in recycling and composting from 2006/07 may be due to RBWM up to 2009, like the other Berkshire Unitary authorities, having a kerbside recycling service based on a 55L box collection. This collection arrangement changed in 2010 with the introduction of a 240L wheeled bin for mixed dry recyclables (mixed paper, glass, cans and plastic bottles) coupled with a reward scheme. This new scheme was piloted in June 2010 and was introduced across the whole of RBWM by January 2011. Initial results from the scheme suggested an increase in recycling and composting to 39% for 2011/12.

Table 4.3 Household recycling 2002/03 to 2008/09 NI 192

ENGLAND AND REGIONS – Percentage recycling and composting							
	BVPI 82a +b					NI 192	
Region	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
North East	6.6	12.2	15.4	21.1	26.4	28.4	31.1
North West	11.3	14.2	19.2	23.8	28.9	33.4	36.6
Yorkshire and the Humber	11.2	14.5	18.6	21.8	26.9	30.5	33.8
East Midlands	15.1	19.3	26.3	31.8	35.6	41.9	44.5
West Midlands	13.0	15.7	19.9	25.1	28.6	33.0	36.6
East	19.4	23.4	29.8	34.1	38.3	41.2	44.5
London	10.9	13.3	17.6	20.7	22.9	25.5	29.2
South East	19.6	22.8	26.1	29.2	33.1	36.0	38.4
South West	18.6	21.4	26.6	31.4	37.2	40.3	42.3
England	14.5	17.8	22.5	26.7	30.9	34.5	37.6
RBWM	22.7	23.3	26.5	28.6	33.2	34.1	36.1

Recycling statistics based on material collected

Table 4.4 illustrates the comparison of national trends for recycling with that of the England and the South East. This suggests RBWM was above the national average for 2005/06 and was comparable with the South East of England overall.

Table 4.4 Recycling by material England, SE Region and RBWM

						1,000 tonnes
	England				South East	RBWM
Household waste	2002/03	2003/04	2004/05 ¹	2005/06	2005/06	2005/06
Total waste				25454	4195	72.6
Recycled						
Paper & card	1,126	1,272	1,406	1,475	243	9.7
Glass	470	568	670	760	147	1.1
Compost	1,189	1,362	1,960	2,439	408	5.5
Scrap metals & white goods	419	465	577	532	110	1
Textiles	54	59	71	86	16	0.2
Cans	28	43	52	74	6	
Plastics	13	17	21	38	5	
Co-mingled	268	469	656	860	233	3
Other	174	266	372	532	57	
Sub-Total Recycling	3,740	4,521	5,785	6,796	1,227	20.5
Percentage of household waste				26.70	29.20	28.6

Note: the above detailed information figures for national and regional recycling by material are available to 2007/08 after which the information can only be accessed via the Waste Dataflow system.

In comparison with other local authorities and with national and regional performance²¹ it is suggested that RBWM is reasonably typical in terms of household recycling. The data obtained based on recycling performance may therefore be applied to areas beyond RBWM including similar sized local authorities in the South East of England.

4.3 Waste composition and participation

An assessment of the performance of RBWM in terms of actual behaviour was obtained from a Household Waste Composition Analysis (WCA) and a household recycling kerbside participation survey. A brief summary of the findings and recommendations from these activities follows:

4.3.1 Household Waste Composition Analysis

In June 2005 and February 2007 a waste composition analysis was conducted by MEL consulting for RBWM, organised by the researcher in his waste management practitioner capacity. The Waste Composition Analysis exercises involved collection of data on household residual waste in terms of volumes and tonnage, based on a sample of 100 properties randomly selected across the Borough.

Methodology for Waste Composition Analysis

Waste Composition Analysis (WCA) is undertaken by many local authorities as a means of identifying what materials are being diverted to recycling and what is left in the residual stream. The methodology for WCA is standardised and uses the ACORN (A Collection of Residential Neighbourhoods) classification system for results interpretation. The WCA conducted for RBWM was based on 2001 census data and profiles properties into 5 broad categories with 1 being the most affluent. Table 4.5 illustrates the ACORN categories used in the WCA for RBWM.

²¹ Current information on national and regional recycling performance is provided in Chapter 1

Table 4.5 Profile 2005 for RBWM as classified by ACORN

ACORN	No of Households	% of Households
1	21725	39.45
2	9616	17.46
3	15788	28.67
4	2584	4.69
5	5198	9.44
Unclassified	161	0.29
Total	55072	100

ACORN has since the 2006 WCA survey been modified to take into account key shifts in UK consumer patterns, changes in the workplace, education and family structure over the last decade. Another socio-demographic classification system is MOSAIC, which was used to identify consumer patterns regarding recycling behaviour in RBWM (RBWM, 2005). However, as stated in Chapter 1, socio-demographic information will not be used to interpret the results from the analysis of data in this thesis. ACORN is provided to illustrate how a WCA is undertaken for local authorities. WCA requires the sorting of the contents from a collective sample of residual waste obtained from a number of properties across the study area. These material streams are then weighed and a percentage of each material calculated to identify how much recyclable material remains in the residual stream. Table 4.6 lists the general categories of material analysed which are reviewed in detail in terms of the findings from the study area later in the Chapter.

Table 4.6: Waste Composition Analysis – kerbside residual container

Material	Material
Paper and card – newspapers/magazines including cardboard	Miscellaneous combustible
Plastic film	Miscellaneous non-combustible
Dense plastic – including bottles and other packaging	Putrescibles – food, garden waste, raw fruit and vegetable matter
Textiles	Fines (particles <100mm)
Glass – all bottle/jars and other glass	Household Hazardous Waste (HHW)
Ferrous & non- ferrous metal – including food & drinks cans, foil and aerosols	Waste Electrical and Electronic Equipment (WEEE)

The category 'putrescibles' includes soft garden waste, woody waste and food waste (cooked food and uncooked kitchen waste). Non-ferrous metal also includes batteries. Miscellaneous combustible includes shoes, disposable nappies, treated and non-treated wood. Non-combustible material includes DIY, rubble, ceramics, carpets, flooring plus animal waste.

Trend analysis

A trend analysis was conducted by the researcher to identify two key aspects, which included:

1. Changes in waste composition from the 2001 and 2005/06 surveys and;
2. How the composition of the refuse had changed since the introduction of the enhanced kerbside recycling service in November 2005.

Waste Composition Analysis 2000 to 20005

It was felt by the researcher that comparison of the WCA data from the 2001 and 2005 surveys would provide a representative picture of changes in waste composition not associated with changes in service. This was due to there being no significant changes to the kerbside recycling collection until November 2005. In this regard if the 2006 waste composition data were included this may distort the interpretation of the 2001 to 2005 results as changes in service were introduced to the kerbside recycling service, which are reflected in the 2006 WCA survey. The results from the period 2001 to 2005, suggest that the overall weight of the residual bin contents had increased mostly due to putrescibles. However there was an observed decrease in paper & card with glass being similar to the levels from 2001.

Waste Composition Analysis 2005 to 2006

A WCA conducted in January 2006, also organised by the researcher for RBWM, included the determination of capture rates (which were not undertaken for the 2001

and 2005 WCA surveys). Capture rates are the amount of a particular material that is captured by the scheme (WRAP, 2006b) and are given by the formula:

Capture Rate

Quantity of a particular targeted material collected for recycling/composting

Quantity of that targeted material collected for recycling/composting + quantity of
target material collected for disposal

This provides a means to identify how much of a recyclable material is collected by the kerbside collection service, what proportion of this material is collected for recycling, and how much remains in the residual stream. The quantities of materials delivered to the Council's Household Recycling Centre (HRC) were also included in the 2006 WCA survey to provide a complete picture of material flow. The general findings in terms of this survey were:

- ◆ On average households recycled 4.76 kg per week into the kerbside scheme. There was a further 2.61 kg/hh/wk of recyclable material remaining in the residual waste. In July 2005 this recycling rate was seen to be 2.7 kg recycled per week with a further 2.8 kg/hh/wk remaining in the residual stream.
- ◆ The overall contamination level of recycling boxes overall was 0.17 kg/hh/wk, which was nearly half the July 2005 figure of 0.28 kg/hh/wk.
- ◆ The kerbside recycling scheme had an average diversion rate of 28% and an average participation rate of 61.9%. These figures are a considerable improvement of the July 2005 figures (14% and 44% respectively).

It was apparent that the introduction of the enhanced kerbside recycling service in November 2006, involving kerbside collection of mixed glass, had a positive effect on waste composition. Table 4.7 shows capture rates per materials during January 2006.

Table 4.7 Capture rates for kerbside recycling RBWM– January 2006

Capture Rates – Dry/Mixed Scheme January 2006	
Primary category	Average
Paper	68.5%
Card	59.5%
Plastics	44.3%
Glass	70.7%
Ferrous cans	30.6%
Non-ferrous cans	22.9%
Overall material capture rate	64.6%

As observed from Table 4.7 kerbside collected glass is captured most out of the system followed by paper and card. Although not shown in Figure 4.7, the residents in the ACORN 1 group have the highest capture rate of recyclable materials. This group is also associated with more affluent areas of the community. It is suggested that where capture rates were poor then intervention campaigns should focus on communication as to what can and cannot go in the containers. The activity also focussed on all households served by the scheme and not on households which use the service, which is measured by the '*Recognition Ratio*' (WRAP, 2010b).

Results from Household Recycling Centre

Items for recycling are delivered to the HRC in addition to the network of local recycling 'bring banks'. However the waste composition analysis did not include, due to cost and logistics purposes, analysis of the Council's recycling bring banks. The method of sampling for HRCs differed from the kerbside method in that every tenth visitor was interviewed and their postcode obtained. A total of 40 visitors per day were sampled with the survey being conducted over a two-day period. All waste where possible was sorted into standard categories and weighed. The findings from this exercise for the January 2006 survey were compared with 2005 and 2001 and are listed below:

- ◆ An average of 26kg was obtained per visitor in 2006, which was similar to that recorded in July 2005. This figure was 38.44 kg in 2001.

- ♦ The overwhelming majority of the people visiting the HRC (77.2%) stated that they lived in the SL6 (Maidenhead) area of the Borough
- ♦ The most common type of waste taken to the HRC is other non-packaging dense plastic. This was brought to the site by 19 of the 79 visitors sampled. In 2001 the most common waste type was garden waste, which was brought by 64% of visitors.

Tables 4.8 and 4.9 illustrate the quantities of significant waste materials and the most common items brought to the site respectively.

Table 4.8 Quantities of significant materials – January 2006

Sub-category	No of visitors		
		Weight (kg)	% of visitors
Furniture	16	626.7	27.11
Carpet & underlay	8	322.2	14.25
Treated wood	7	183.8	8.13
Flooring/tiles	6	152.8	6.76
Mixed household, unsorted black sacks	17	148.8	6.58
Other non-packaging dense plastic	19	132.4	5.86
Other non-combustible	5	109.0	4.82
Computers	3	107.8	4.77

Table 4.9 Most common items brought to the HRC – January 2006

Sub-category	No of visitors	Weight (kg)	% of visitors
Other non-packaging dense plastic	19	132.4	24.1
Mixed household, unsorted black sacks	17	148.8	21.5
Furniture	16	626.7	20.3
Rags	13	58.1	16.5
Other ferrous metal	11	44.5	13.9
Dense plastic packaging	8	33.3	10.1
Carpet and underlay	8	322.2	10.1
Treated wood	7	183.8	8.9

From Table 4.8, the greatest weight was for furniture items and accounted for 28% of the total weight received from the sample. However from Table 4.9 it is observed that other non-packaging dense plastic waste is the most common material, which

accounted for 45% of the sample. In terms of biodegradable material, almost 40% of material was biodegradable compared with 5% of dry recyclables.

From the HRC waste composition analysis survey, the most prevalent material in terms of percentage of total waste received was: furniture at 28%, carpet and underlay at 14%, treated wood at 8%, flooring and tiles at 7% and finally mixed household sacks at 6.5%. Soft garden waste, accounted for 11% of total waste; however, this was mostly received on a weekend. Clearly from the results of the waste composition analysis, there were opportunities to significantly increase recycling. The composition of materials received at the HRC is considerably different from the materials collected from the kerbside service (refuse and recycling) and is comprised primarily of bulky waste. The Council operate a bulky waste collection service however this is a chargeable service, whereas delivery by the resident to the HRC is not associated with a fee. Some of the materials however collected from the kerbside recycling service were received at the HRC plus other non-kerbside materials suggesting a choice in recycling and recycling materials beyond the kerbside service.

4.3.2 Household Recycling Participation Survey

Introduction

A participation survey was organised, by the researcher in his waste practitioner capacity, for RBWM in June 2006. This exercise involved the selection of a household waste recycling collection round with the Council's waste management contractor Veolia Environmental Services (VES) for conducting a series of observations regarding the setting out of recyclable materials and levels of contamination. This exercise also provided data for research purposes, on actual observed recycling behaviour for which the process is described in the following sections.

Selection of sample size and validity

The guidelines developed by the Waste and Resources Action Programme (WRAP) (WRAP, 2006b) included a section on monitoring of collection scheme usage and participation. This included two conditions to enable a representative sample of properties to be obtained, which are sample size and homogeneity of the sample. The first condition is associated with the level of confidence and degree of precision i.e. the probability that the figure obtained would be similar if the entire population was surveyed and, the size of the range a result would fall into. These limits for waste-related surveys are normally expected to be 95% and +/- 3% respectively. Therefore a minimum sample size of 2,400 is required for a 95% confidence level and +/-2% precision.

The second condition, homogeneity ensures the results of the survey are representative of the whole population. This is based on the distribution of housing type and geographical nature of area (urban/rural). The recycling collection service for the Borough is split into eight rounds of varying size and housing type/area. An assessment of the collection rounds based on the above two sampling conditions identified two rounds (Round 4 and Round 7) satisfying these criteria. Due to cost implications of conducting the survey a decision was made to select Round 4, which was also the more representative in terms of housing stock. The number of properties served by recycling collection round 4 is approximately 7,830, which is well within the minimum sample size in accordance with WRAP (2006b).

Survey method

The actual behaviour survey examined 'participation rate' and 'set-out rate' plus 'materials presented' and 'contamination level' in order to obtain a complete picture of the level of understanding in addition to use of the recycling service. The exercise

was conducted over a three-week period from 26th June 2006 to 14th July 2006. The respective findings are summarised in the next few sections.

Participation rate

Participation is a measure of the proportion of households that take part in at least once in the defined period. This enables the assessment of the extent to which the scheme is being used. It is calculated over three collection cycles due to the fact that many households do not set out their container each time for various reasons such as not being full, residents 'forget' or are 'away' from the property. Participation rate is calculated as follows:

Participation Rate

No of households putting out container(s) at least once in a defined period x 100

Table 4.10 Participation rate summary of results (collection round 4)

Day	Area	Participation all props.	Participation including Flats (assume 100% participation where communal bins are provided).	Participation (ex flats).
All	All	71%	75%	79%

Results of household kerbside recycling participation survey

The participation rate survey was conducted based on a kerbside collection round (round 4) that was considered the most representative of the 10 rounds in operation in terms of housing stock across the Borough. Table 4.10 shows the results of this survey where from a total of 7,827 properties serviced by round 4 there were 5,596 properties recorded as participating in the kerbside recycling service or 71% (Column 3 of Table 4.10). However, there are 758 multiple occupancy properties (MOPs) associated with collection round 4 or 10% of the total. At the time of measurement 240 of these MOP sites were provided with communal recycling bins. Therefore column 3 of Table 4.10 assumes zero participation from MOPs. To

address this anomaly the number of MOPs issued with communal recycling bins was added to the observed participation based on an assumed 100% participation from all properties as shown in column 4. This means if there were 6 properties served by a communal system 6 would be participating. The maximum projected participation from this calculation was 75% $(5596 + 240)/7827$. However this is flawed in that:

- ❑ It is virtually impossible to measure the contribution from individual households participating from a communal service. Therefore based on a communal bin serving 6 properties, participation may be from all/more or less than all of the households.
- ❑ It artificially skews the results, as 518 of the 758 MOPs do not have kerbside recycling capability.

In this regard a more accurate measure of participation was obtained by taking the low level properties served by the box recycling system (total properties minus flats = 7,069) and from this a total of 5,584 of these types of properties were recorded as participating. This represents a participation rate of 79%, which is set out in column 5 of Table 4.10 and was used as the reported figure for actual behaviour.

Comparison of participation with capture rates

Participation rate provides a general measure of actual use of the kerbside service but does not measure rates of recycling of any specific material. Capture rates however measure the quantity of target material 'captured' divided by the total quantity of that type of material present (WRAP, 2010b). The average capture rate for all materials is 65%; however, a higher percentage was observed for glass and paper at 71% and 69% respectively. These materials would be expected to be set out for collection by households and would have been collectively recorded in the participation survey. In addition, the introduction of kerbside collection of glass in

November 2005 would be expected to generate initially higher participation than other materials as evidenced from previous observation of uptake of recycling schemes in RBWM. This would place capture rate of at least 1 material at 71% using glass as the surrogate measure. Although this rate is close to the participation rate recorded for recycling, it needs to be borne in mind the different sizes of sample (capture rate 100 properties vs. participation rate 6,000 properties). In addition the situation of low participation and high capture rate and vice-versa can occur as it is more realistic to expect that not all participating households are putting out all of the targeted material all of the time (WRAP, 2010b). Nor is it realistic to expect high levels of participation across all areas served. In this regard it may be suggested that at best the observation from the capture rate and participation rate exercises may be suggested to be indicative of relatively high participation in a recycling scheme.

4.3.3 Household Opinion Survey

In spring 2005, a postal survey of attitudes and opinions regarding the Borough (RBWM) and its partner organisations was conducted. This survey identified levels of satisfaction, expectation and usage of key Council services including waste for which responses were obtained from a panel of volunteers who were residents of the Borough and termed the View-Point Panel. Topics surveyed included: experience of and satisfaction with, Council services; contact with the Council; waste management and recycling, crime, drugs and anti-social behaviour.

Method

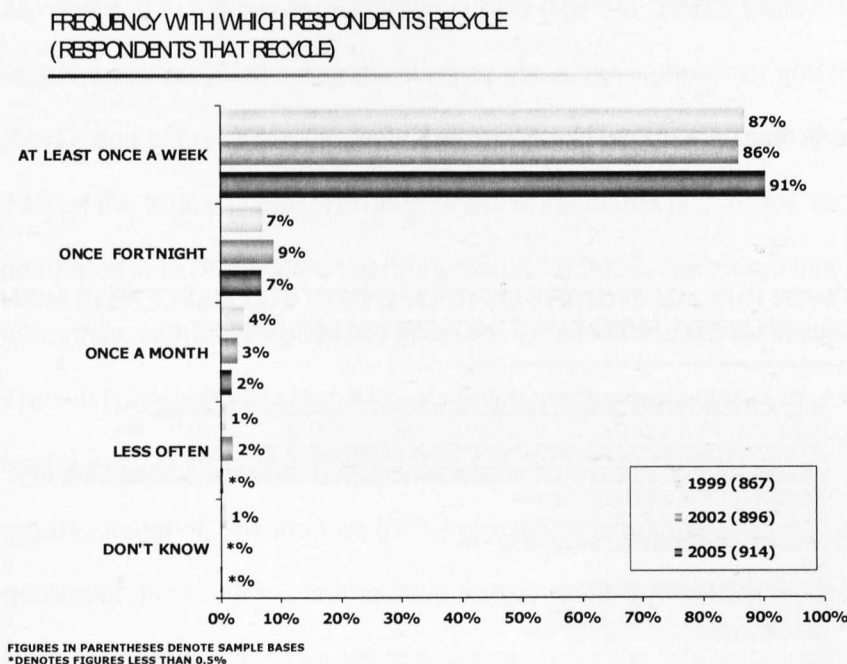
A stratified sample was adopted for the opinion survey, to ensure a representative distribution of responses to the questions asked, across the population. In the process of drawing up a stratified sample, Census Output Areas were grouped with others of a similar profile and nature, so that those selected as sampling points were similar to those that were not. Typical sample sizes for opinion surveys are

approximately 1,000 residents, and an actual sample size of 1,068 was obtained for the 2005 opinion survey.

Recycling

Figure 4.2 suggests that frequency of recycling is relatively unchanged. The survey identified that the majority of respondents recycle materials such as glass, newspapers, or soft drinks cans (86%), which was similar to the results from the 1999 and 2002 surveys.

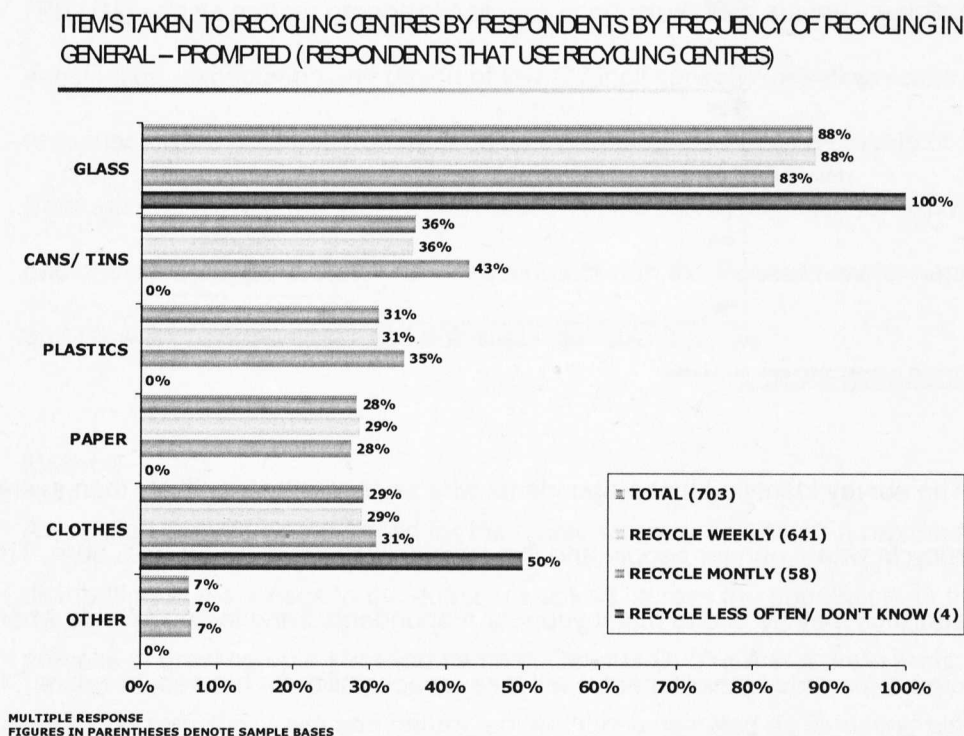
Figure 4.2 Claimed recycling frequency



The survey identified that respondents who were slightly less likely than average to recycle were younger people and the elderly (77% aged 16-24; 92% 60+). These statistics may be due to many younger respondents living in households where others (parents / other tenants) will take responsibility for household waste. However, the survey responses may reflect intended or preferred behaviour, rather than actual behaviour. Thus high levels of claimed recycling may capture a percentage of respondents who intend to recycle weekly, and may not be related to

actual behaviour. In previous surveys, residents were asked about 'bring banks'; in the 2005 survey this focus was changed slightly, and the term 'recycling centres' was used. Whilst comparison between the 2005 survey and previous surveys is offered, caution should be exercised in how far residents will interpret 'bring banks' and 'recycling centres' to be the same entity. From previous surveys, just over two-thirds (68%) of those who recycled used local bring banks, increasing to 77% using recycling centres in 2005. More than half of RBWM residents who recycled at local recycling centres (60%; 39% of the total sample) claimed to recycle at least once a fortnight, with males amongst those most likely to do so weekly (39%; compared with 33% females; 36% sample average). In terms of what the respondents use the bring banks to recycle, the most common answer by far was glass (89%), which reflects findings in 2002 (96%).

Figure 4.3: Items taken to bring banks



The Council undertook a comprehensive refurbishment programme of all its bring banks during 2002-4 following previous surveys, focussing upon increasing the range of materials collected, improving user accessibility and installing new receptacles. Glass banks were converted from separate 'mixed' glass containers to improve the ease and convenience for users. Given then, that the main reason for residents visiting local recycling centres is to recycle glass, it is unsurprising that when asked, 84% would find it useful to have a doorstep collection for glass on a fortnightly basis. This result could be viewed as an endorsement of the Council's decision to include glass as part of its drive to reduce waste to landfill.

Summary of findings of opinion survey

As recorded in the previous opinion survey (RBWM, 2005), the majority of respondents recycled materials such as glass, newspapers or soft drinks cans (86%), and of these respondents, most claimed to do so at least once a week (91%; 78% of the total sample). Three-quarters of residents (77%) use 'recycling centres' compared with 68% who used 'bring banks' in 2002. Residents use these facilities fortnightly, with the recycling of glass being a main reason for visiting these facilities. Thus, it is unsurprising that 84% of survey respondents stated they would find it useful to have a doorstep collection for glass on a fortnightly basis. When it comes to organic material, one in three (35%) respondents composted their waste, which is a decline on the results from the 2002 survey at 38%. The majority take this to an HRC (46%); propensity to do so reflects general recycling habits, being highest amongst those who use recycling centres once a week (39%), reducing to none of those who visit centres less than six-monthly.

4.4 Implications regarding TIB

This section considers the data from the study area in terms of its linkages to the TIB components. These components include social norms, facilitating conditions, attitude and habit. However, due to the broad nature of the Council's performance data, the

results are inconclusive based on participation rates, WCA and what household opinion surveys are suggesting about these components. Social factors are one of the main components of behavioural intention in the TIB along with cognitive attitude, affect and personal norms. The results from the household recycling participation survey and opinion surveys undertaken in 1999, 2002 and 2005 suggest a high level of recycling ethos is present across the study area. This may indicate the presence of strong social norms to recycle operating within the community and households surveyed. It is not however apparent whether these social norms are descriptive or injunctive social norms or indeed whether there are personal norms in operation (Cialdini et al, 1990, 1991). In this regard further work is required to identify the individual behavioural determinants of household recycling in terms of social and personal norms.

The pattern of waste diverted from the residual stream to recycling also appears to increase from 2004 to 2006 which is particularly noticeable with dry recycling and suggests a 20% to 25% overall increase. This was suggested to be due to the introduction of kerbside collection of mixed glass. This trend may indicate an element of increased participation due to convenience of the service, which is a situational factor (Chapter 2, section 2.2.2) and a facilitating condition in accordance with the TIB. Current levels of satisfaction of the service in 2005 according to the RBWM opinion survey (RBWM, 2005) suggest an easy to use service, which could be enhanced with introduction of a kerbside mixed glass collection. However earlier opinion surveys suggest limitations were experienced with the kerbside recycling service due to the collection containers being based on a single box system, therefore limiting capacity for recycling by the householder.

Another observation is the significant increase in garden waste from 2006/07 to 2008/09. This may be indicative of influence to recycle garden waste based on facilitating conditions with convenience, collection container, and frequency of

collection of this material being potential explanations behind this observation. There is also a relatively high degree of overall recycling at the HRC site at 65% based on the results of the 2006 WCA. This suggests a variation in the choice of facility for recycling and inferring a proportion of residents recycle beyond the kerbside service and providing an indication of motivation of the individual beyond facilitating conditions. The residual waste volumes for the January 2006 Waste Composition Analysis were converted into residual kerbside waste tonnages using 2007/08 tonnages for the Borough. This provides a means of estimating the annual tonnage per material stream showing the percentage of recyclable and non-recyclable materials for kerbside collected residual waste for the Borough, which is illustrated in Table 4.11..

From Table 4.11 this suggests that for 2007/08, the total residual waste excluding clinical and special collections was 35,270 tonnes. This does not however include the tonnage of materials collected for recycling as the aim of WCA is to identify “what is in the bin”. In addition, the fraction identified in Table 4.11 as ‘potentially recyclable’ only includes those materials accepted in the kerbside scheme, which includes green waste. All other potentially recyclable materials such as food waste were ignored and placed within the non-recyclable category as the objective was to survey those materials currently collected via the kerbside service. Based on the above annual tonnage, a total 6,573 tonnes of materials which are collected via the kerbside recycling service still remain in the residual stream. In addition, approximately 2,500 tonnes of garden waste which could be recycled via the HRC or via the appointment service is disposed of in the residual container. In other-words, out of a total 26% of recyclable material remaining in the residual stream 19% is dry recyclable material and 7% is green waste. There may be plausible explanation for this such as soiled paper and card which would normally be rejected from the recycling containers.

Table 4.11 Waste Composition 2007/08– kerbside residual waste collection RBWM

Primary categories	Sub-categories	Concentration %		Tonnes
Paper and card	Newspapers and magazines, brochures and catalogues	5.22	16.45	1841
	Other recyclable paper inc envelopes & junk mail	2.69		949
	Yellow & White Directories	0.04		14
	Shredded Paper & Tissue Paper	1.7		600
	All Non-recyclable paper & card	3.8		1340
	Tetrapak Cartons	0.3		11
	Corrugated cardboard	0.68		240
	All Thin card inc packaging, Egg Boxes, Toilet Tubes & Greetings Cards	2.02		712
Plastic film	Packaging film	2	3.9	705
	Supermarket Carrier Bags	0.66		233
	Other Carrier Bags	0.51		180
	Other film	0.8		282
Dense plastic	PET bottles – Type 1	0.61	7.3	215
	HDPE bottles – Type 2	0.54		190
	Vinyl Bottles – Type 3	0		0
	Other plastic bottles	0.17		60
	Polystyrene	0.16		56
	Plastic Food Packaging Trays , Containers and Pots – also flower pots	2.62		924
	Other packaging	0.77		272
	Other dense plastic	2.43		857
Textiles	Reusable Textile Clothing	0.78	2.77	275
	Duvets, Sheets, Blankets, Curtains, Towels & Other material	0.77		272
	Soft Toys	0.01		4
	Handbags	0.15		53

	Pairs of Shoes	0.35		123
	Rags	0.71		250
Misc. combustible	Unclassified	2.21	7.77	779
	Disposable nappies	4.88		1721
	Treated wood	0.67		236
	Non treated wood	0.01		4
Misc. non-combustible	Unclassified	1.64	1.64	578
Glass	Green Packaging glass	1.81	4.1	638
	Brown Packaging glass	0.32		113
	Clear Packaging glass	1.55		547
	Red & Blue Packaging glass	0.02		7
	Other glass	0.4		141
Ferrous metal	Cans	0.73	1.66	257
	Aerosols	0.17		60
	Other Ferrous Packaging	0.12		42
	Other ferrous	0.64		226
Non-ferrous metal	Cans	0.27	0.95	95
	Aluminium foil & Aluminium Food Trays	0.34		120
	Aerosols	0.1		35
	Other Non-ferrous	0.24		85
Putrescibles	Soft garden waste	7.08	48.99	2497
	Woody garden waste	0		0
	Raw fruit and vegetable matter	18.75		6613
	Cooked/prepared food inc all meat and fish	19.86		7005
	Unidentified	3.3		1164
Fines	Particles < 10mm	2.75	2.75	970
HHW	List all inc paint cans, including Batteries	0.45	0.45	158
WEEE	List all	1.23	1.23	434
Total Weight				35270
POTENTIALLY RECYCLABLE		25.72		9070

Note: 1. Boxes shaded blue are materials collected through the kerbside recycling service

Note: 2. Boxes shaded amber indicate materials collected kerbside by appointment

However as seen in Table 4.11, there are a large number of sub-categories which people may not be aware can be recycled and therefore place the material in the residual container. This may be as a result of habit (a major TIB component) in which the individual places what they think is recycling in the recycling box and the rest in the residual bin or may be due to non-recycling behaviour. Conversely, the recyclable material may be placed in the residual stream due to facilitating conditions (lack of knowledge or awareness) as to whether item e.g. telephone directories can be recycled. As discussed in Chapter 1, section 1.4, not all local authorities accept the same materials in their recycling programmes with telephone directories being an example of this. The individual may have relocated from an area which does not accept directories and assumed the same practice was in place for their new recycling service.

4.5 Conclusion

Concluding this Chapter, the data from the opinion surveys are too broad to draw any indication of the specific determinants driving behaviour. Follow up surveys need to include specific questions based on various aspects of recycling behaviour. In addition, the WCA sample only covers 100 properties and in terms of its relatively small sample size can at best be indicative of recycling and waste disposal practices across the whole Council population. Having said this, it is impractical and costly to undertake a waste composition analysis covering an entire collection round as for participation surveys. The following Chapters examine household recycling in terms of claimed behaviour using a mixed method approach, which includes combined quantitative and qualitative analysis to identify relationships and key factors for behavioural determinants of household recycling and to test the TIB. A comparison of actual behaviour (from the participation survey results) is included in Chapter 5 to identify over reporting and how this compares with findings from other research. The investigation and analysis of claimed behaviour is included in Chapters 5 to 7.

CHAPTER FIVE: Phase II - Preliminary analysis of household recycling behaviour

5.1 Introduction to the chapter

The previous Chapter focussed on the first phase of the work plan providing a review of the study area local authority the 'Royal Borough of Windsor and Maidenhead' (RBWM). The kerbside household recycling participation survey conducted in June 2006 provided a means to measure 'actual behaviour'. This was later used for comparison with 'claimed behaviour' to identify the degree of false reporting in terms of over and under claiming. The second phase of this research involves the analysis of data from the RBWM 2006 'claimed behaviour' survey by the researcher. This also involved analysis of the information using the Theory of Interpersonal Behaviour (Triandis, 1977) or TIB to explore whether TIB is an appropriate model for understanding recycling behaviour. This Chapter provides information on the phase II work including design of a survey to measure claimed behaviour from a household perspective, and review of the initial findings from this survey.

5.2 Summary of work plan for phase II

Phase II of the research programme, which is set out in Chapter 5 and 6 of this thesis comprises the following elements:

- ◆ Defining questions from the claimed behaviour survey which represent household recycling behavioural determinants
- ◆ Selection of questions from the claimed behaviour survey for use as proxies for representing the components of TIB.
- ◆ Examination of the data from each of the proxy questions, to explore the relationship between the TIB components and recycling behaviour from the survey

- ◆ Comparison of 'claimed behaviour' with 'actual behaviour' and comparison with findings from previous research
- ◆ Developing a group of samples from the survey panel respondents representing a behavioural typology and testing to identify patterns of influence for each behavioural group.

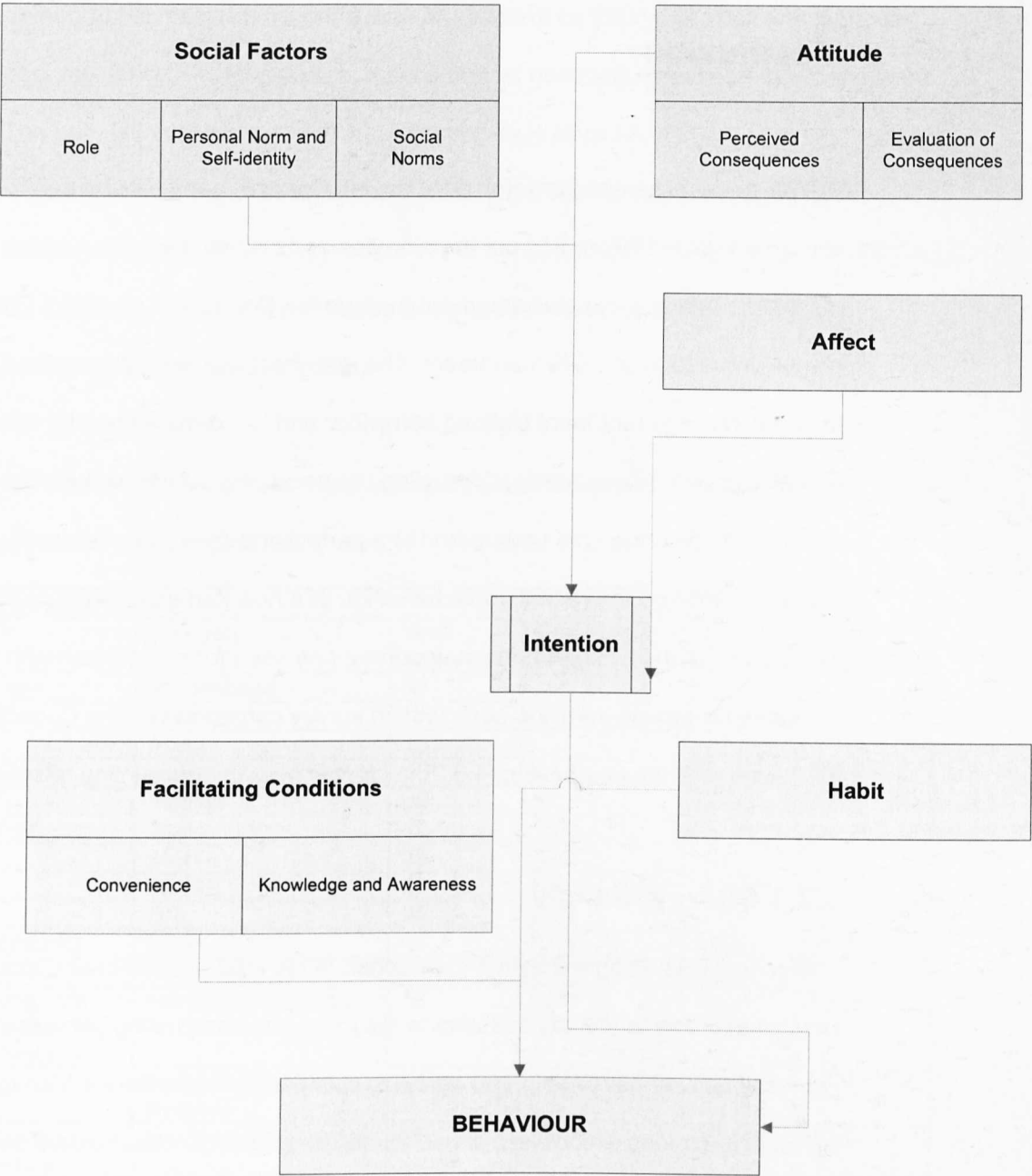
5.2.1 Factors Affecting Behaviour

Triandis Theory of Interpersonal Behaviour (TIB)

The TIB was selected due to its ability to illustrate in simple terms the predictor variables or 'determinants' associated with recycling behaviour. According to Triandis (1977; 1980) behaviour is determined by three dimensions, which include intention, habit and facilitating conditions.

The first dimension 'intention' is based on an individual's motivation regarding performing of a given behaviour, which is influenced or formed through attitudinal, affective and social factors. The second dimension, 'habit' is based on the degree of routine associated with an activity, with a measure of this being frequency of occurrence. The third dimension, 'facilitating conditions' represent objective variables that promote or impede a particular behaviour. It was also noted that previous research using the TIB model was used to measure behavioural determinants in health applications (Gagnon et al, 2003; Gagnon et al, 2006) and information technology (Bergeron et al, 1995). To date based on current information the TIB model has not previously been applied to household recycling behaviour. However the TIB, like similar behavioural models, does not include feedback loops or indicative strength of influence associated with each component in the model. This resulted in an option for developing a dynamic model based on the TIB or using the static version of the TIB to map behavioural determinants from the claimed behaviour questionnaire (RBWM, 2006).

Figure 5.1: Framework for TIB model



It was decided by the researcher to use the static version of the TIB as it replicates what other researchers have done using similar models when investigating recycling behaviour. The full framework in which household recycling behaviour was investigated using the TIB model is provided in Figure 5.1.

5.3 Survey on household recycling claimed behaviour

RBWM council (hereinafter referred to as 'the Council') carried out a public opinion survey in March 2006 to find out the attitudes and claimed behaviour of the residents. This survey was carried out through the Council's 'View Point Panel', comprising a total of 1,042 volunteers. The data from this survey were then used by the researcher to represent claimed behaviour and to examine the inter-relations associated with determinants of recycling behaviour in accordance with the research question. The survey was undertaken at a particular point in time to identify changes in performance on the recent implementation of a new kerbside recycling service. The data from the claimed behaviour survey was used for comparison with the household recycling kerbside participation survey carried out by the Council (and discussed in Chapter 4 section 4.3.2) to identify over/under claiming of behaviour.

5.3.1 Survey design

The survey was designed by the researcher, in his waste practitioner capacity, as a Council exercise to identify attitudes to recycling and composting behaviour. The process involved developing and agreeing with the Council's Senior Management a series of questions which were aimed at exploring factors householders deemed important in influencing their recycling behaviour. Of the 1042 questionnaires issued, 506 panellists returned a completed questionnaire by the closing date, providing a very satisfactory response rate of 49%, compared with the 2005 Opinion survey (RBWM, 2005) for which a response of 39% was obtained.

5.3.2 Viewpoint Panel

The Council's 'View Point' panel is recruited on a paid volunteer basis and is part of the Council's policy for consultation on service provision and user satisfaction. The

panel, which is refreshed on an annual basis, is selected based on socio-demographic make-up covering over 30 different components addressing gender, age, residency, housing tenure, marital status, occupation and economic profile etc. The population in terms of RBWM households is circa 58,000, for which the survey aimed to obtain responses from approximately 2% of its households. The 506 completed questionnaires represent 1% of the population of RBWM. The selection of the Council's View Point panel was designed to ensure a representative demographic sample distribution.

Table 5.1: RBWM View Point Panel 2006 profile and comparison with Berkshire and national population statistics (ONS, 2001)

Panel profile %					
	Category	% of panel	% of RBWM population	% of Berks	% of England
Area	Maidenhead	50			
	Windsor	37			
	Ascot	13			
Gender	Male	45	49.3	49.9	48.7
	Female	55	50.7	50.1	51.3
Age	16-24	12	10.9		
	25-44	28	30.2		
	45-59	25	6.6		
	60+	25	20.3		
Ethnicity	White	95	92.5	88.7	90.9
	non-white	5	7.5	11.3	9.1
long term illness/ disability	has illness/ disability	10	12.6	12.5	17.9
	does not have illness/ disability	90	87.4	87.5	82.1
marital status	married/living together	66	49	50.1	44.8
	single/divorce	34	51	49.9	55.2
Children	have children	52	29.2	72.1	82.3
	Do not have children	48	19.8	27.9	17.7
employment status	Employed	67	68	69	60.9
	out of work	33	32	31	39.1
	self employed	8	10.5	9.0	8.3
	Employed full time	42	46.6	49.0	40.8
	Employed part time	17	10.9	11.0	11.8
	Unemployed	1	2.0	2.0	3.3
	looking after home	4	7	6.0	6.5
	Retired	22	12.8	11.0	13.54
SAMPLE BASES		506	133,626	800,000	52.1m

Table 5.1 provides a demographic breakdown of the panel which is compared with the population of RBWM, Berkshire County and national statistics in accordance with the respective groupings from the 2001 census (ONS 2001). Oskamp et al (1991), in selecting a panel of respondents, established a boundary limit based on the demographic make-up of the survey panellists and the population the survey is representing. He proposed that a survey panel is representative of the wider population if the socio-demographic make up of the panel is within 10% of the wider population. The Council's View Point panel was confirmed to be in accordance with the 10% boundary limit schema set out by Oskamp et al (ibid), and is considered representative of the population of RBWM. There are also similarities in terms of the socio-demographic make-up of the panel with that of Berkshire. This suggests that the findings from analysis of the survey may be applied to a wider area.

The previous Chapter identified from a review of the recycling performance of the Council that its characteristics were not atypical for a South East England local authority. Therefore the claimed behaviours from the Council's survey respondents may be applied to RBWM, Berkshire and other local authorities with similar recycling collection services to that of RBWM.

5.3.3 The questionnaire

The process of questionnaire design involved a series of draft versions which were internally reviewed for appropriateness by Council Officers (including the researcher in his practitioner capacity). The questions for this survey were developed from previous Council surveys on service satisfaction and, from a bank of questions included in the Waste and Resources Action Programme (WRAP) monitoring and guidance manual (WRAP, 2006b). The questions covered several key issues associated with household recycling practices, global environmental values, general knowledge and interest, awareness of local recycling services/facilities, as well as questions on panellists' involvement in their local community. The survey questions

were then organised by the researcher into sequential order with assistance from the Council's appointed contractor for opinion surveys, BMG. Following recruitment of the residents panel (View Point Panel) by BMG, the revised and agreed final questionnaire was then mailed by post to each panellist for completion and return to BMG. This resulted in the provision by BMG of a report for the Council outlining trends associated with recycling behaviour (RBWM, 2006). Anonymised data from the 2006 survey was used for analysis in this research. The final questionnaire, issued to the View Point Panel in January 2006, is attached in Appendix 1.

5.3.4 Survey questions and their relation to the TIB components

Many of the questions from the 2006 questionnaire used a 'Likert' (1932) scale. Questions presented in this format provide a suitable means of statistical analysis and testing of hypotheses. The questions from the Council survey (RBWM, 2006) are summarised below in accordance with their subject groups together with a link to the respective TIB component.

Attitudes to the environment (Q1)

Panellists were asked to quantify their attitudes to the environment, by rating their level of concern with a number of environmental impacts, on a scale from "not at all concerned" to "very concerned". Concern was measured using a Semantic Differential in order to measure a respondent's reaction to stimulus words, which are rated on bipolar scales defined with contrasting adjectives. This is suggested to be related to the TIB component affect in terms of feelings toward each environmental issue. Affect represents an emotional state that the performance of a given behaviour such as environmental concern evokes for an individual.

Attitudes to recycling (Q2 to Q6)

Respondents were informed that every hour, enough rubbish is put into household bins to fill the Albert Hall, and asked who they think should be responsible for this, choosing all that apply from a list. Respondents were also asked how important and how convenient it is to recycle their waste. In terms of TIB, responsibility pertains to a prescriptive social norm regarding moral rules, importance is associated with perceived consequences of recycling and convenience is a facilitating condition based on the personal logistics of recycling.

Knowledge and interest in recycling (Q7 and Q8)

All respondents were asked to rate their knowledge of how to recycle and to rate their interest in recycling. This was measured on a scale of 1 to 5, where 1 is "know nothing" and 5 is "know a lot".

Recycling behaviour (Q9 to Q11)

Respondents were asked how often they purchased recycled products on a scale of 1 to 5 as for knowledge and interest and how much they recycled based on a scale of "recycle everything" to "do not recycle". Respondents were also asked why they do not recycle. This included a list of options in which respondents were invited to tick all that apply. This pertains to claimed behaviour from a TIB perspective.

Awareness and use of recycling services (Q12, Q13, Q16 and Q19)

Respondents were asked to tick all categories which applied in terms of the types of recycling services provided in their area and the services they use including the Council's recycling collection service and how often they used this service. A question was also included on the how often their neighbours used the Council's recycling service and what percentage of people in their neighbourhood recycle on a regular basis. Awareness pertains to facilitating conditions and use of services claimed behaviour. Perceived use of recycling by neighbours is a social norm;

however it is not clear whether this is descriptive or prescriptive. Claimed behaviour based on use of kerbside service may also be used for comparison against actual behaviour from the participation survey described in the previous Chapter.

Overflowing bins and recycling containers (Q17 and Q18)

Respondents were asked from a list of options, what they would do when their refuse bin and their recycling bin is overflowing however only one option could be selected. This question was used to identify how side waste is dealt with by the respondent. No TIB components were identified from this question other than claimed behaviour and facilitating conditions, which already have a useful proxy.

Materials that can be recycled (Q21 and Q22)

Respondents were asked to check from a list of items which household items could be recycled and how often they recycled each of these items based on a 4-point scale of “every time” to “never”. From a TIB perspective, the former component is awareness (a facilitating condition). However as the latter question pertains to frequency of performing an activity, then the TIB component is habit.

Motivation to recycle (Q23 and Q24)

Respondents were asked to select “all that apply” from a list of items requesting what motivates them to recycle and what would encourage them to recycle more. None of these questions were scaled and generated multiple responses, however the questions relate to a range of TIB components, which may be used for supporting the results from other TIB specific proxies.

Information on recycling (Q25 to Q29)

Respondents were asked to check whether they were aware of advertising or promotion about recycling, where this information came from and how easy or difficult they found the information. They were then asked if they agreed with the

statements on usefulness of the promotional material and how this affected their behaviour e.g. "learned something from it" and, "recycled more", which was rated on a 5-point scale from strongly agree to strongly disagree. Information pertains to knowledge and is a facilitating condition from the TIB.

Local community (Q34 to Q40)

Respondents were asked a series of questions regarding their role in the community and whether they can influence decisions that affect the area in which they live, and how involved they feel they are in the community. This provides a measure of community influence and represents the TIB component 'role'.

5.3.5 Selection of questions as proxies to represent TIB components

The 2006 claimed behaviour survey was not designed on the TIB and therefore specific questions from the 2006 questionnaire were selected as proxies to represent TIB components. The TIB components 'self-identity' and 'personal norm' could not be represented by specific questions as for the other components. However personal norm was identified from the 'motivation' block of questions. There were also a comparatively greater number of questions relating to facilitating conditions requiring the researcher to be selective. Also included in the questionnaire were a cluster of questions termed the '*Committed Recycler*' which are currently used by WRAP as a 'quick and dirty' means of assessing household recycling behaviour. These were not used in the analysis to test TIB but for Council purposes. This identifies those questions which are Likert (1932) scaled denoted by Y or N, which determines their suitability for statistical analysis. Questions with multiple answers, or those that are not scaled were used to support the observations from the analysis of the scaled proxy questions. Table 5.2 includes a list of the proxy questions selected.

Table 5.2: Potential proxy questions from the claimed behaviour survey for representing TIB variables

TIB variable	Question number	Question description (abbreviated question text)	Scaled Y/N
<u>Attitude</u>			
Perceived consequences	Q4	How important is it for household to recycle?	Y
Evaluation of consequences	Q8	Interest re what happens to recyclables	Y
<u>Affect</u>			
Feelings	Q1.1	Concern re climate change on self	Y
Feelings	Q1.2	Concern re climate change on future generations	Y
Feelings	Q1.3	Concern re rubbish into landfill	Y
Feelings	Q1.4	Concern re pollution in local area	Y
<u>Social Norms</u>			
Descriptive	Q16	How often do your neighbours use recycling service?	Y
Descriptive	Q19	What % of neighbourhood recycles?	Y
Prescriptive	Q2	Who should be responsible for rubbish?	N
<u>Role</u>			
Community	Q34	How involved are you in local community decisions?	Y
<u>Personal Norms</u>			
Personal	Q23/24	What motivates you to recycle/recycle more**?	N
<u>Habit</u>			
Habit	Q15	How often do you recycle (general)?	Y
Habit	Q22 (1 to8)	How often do you recycle (by material)	Y
<u>Facilitating Conditions</u>			
Awareness	Q7	What is your knowledge of recycling?	Y
Reliability	*	How satisfied are you with the recycling service?	Y
Convenience	Q6	How convenient is it to recycle your rubbish?	Y
Information	Q28	Ease of understanding of information provided	N

* Obtained via separate survey (Satisfaction & expectancy) using same panel

** Multiple answers covering a range of categories – copy of questionnaire in Appendix 1

5.4 Analysis of data

The raw data from the Council survey, with permission from the Council, was subjected by the researcher to quantitative analysis. This included observation of percentages from the respondents to identify the overall trend of behavioural determinants based on the proxies representing the TIB. Claimed behaviour in terms of usage of the kerbside recycling service was also compared with actual behaviour from the kerbside household recycling participation survey (Chapter 4, section 4.3.2) to identify potential areas of over-claiming from respondents.

5.4.1 Results of data

The findings from the analysis of the survey were compared with the percentage of responses from the 2005 Opinion survey with regard to claimed recycling frequency and use of facilities to provide a check against claimed behaviour from the 2006 survey.

Follow up analysis from this preliminary review of results involved more detailed statistics to review the proportion of responses and to test the suitability of TIB. Each TIB component in terms of the proxy question is reviewed in terms of overall distribution of percentage responses to identify patterns of behaviour with regard to household recycling. However, even though not all of the questions were specifically associated with household recycling, e.g., role from community involvement the question was still used as a proxy to test TIB.

Intention:

Intention is based on the motivation to perform an activity and is, in accordance with the TIB model, a product of several variables or contributory components which include Perceived Consequences, Evaluation of Consequences, Affect, Social Norms, Role, Personal Norms and Self-identity. Habit and Facilitating Conditions according to the TIB, directly influence behaviour, and in this regard it was decided by the researcher that intention would be described in terms of its contributory components. In addition Q23, which refers to the motivation of respondents to recycle, covers a range of factors across the TIB framework and was used to support the findings from the other proxy questions. These components of intention are dealt with in the following subsections

1. Cognitive Attitude:

The percentages of respondents for importance of recycling and interest in recycling are presented in Tables 5.3 and 5.4 respectively.

Table 5.3 Importance of recycling (% from Q4) n=506

How important do you think it is to recycle the rubbish that households produce?	% of respondents
Very important	88
Fairly important	11
Not very important	1
Not at all important	0
Don't Know	1

Table 5.4 Interest in recycling (% from Q8) n=506

How would you rate your interest of what happens to items sent for recycling on a scale of one to five, where '5' is interested a lot and '1' is not interested?	% of respondents
1 Not interested	3
2	7
3	24
4	31
5 Interested a lot	35

Questions 4 and 8 collectively represent cognitive attitude²² in terms of the perceived consequences (Pc) of performing an activity, and the evaluation of those consequences by the individual (Ec), respectively. Initial observations from Tables 5.3 and 5.4 suggest that 99% of respondents consider recycling important, based on the combined percentage of “very important” and “fairly important” from Q4.

However, when the combined percentage of scores 4 and 5, where a score of 3 was considered a neutral position i.e. neither interested or not interested, a lesser percentage of respondents considered recycling of interest,

To identify which proxy relates to perceived consequences and evaluation of these consequences, the responses to Q23 “motivation to recycle” are considered.

²² Attitude in accordance with Triandis is a layperson's term hence use of Pc and Ec terms

Table 5.5 Motivation to recycle (% from Q23) n= 506

What, if anything, motivates you to recycle? <i>Please tick all that apply</i>	% of respondents
Reduces “amount of rubbish disposal” (landfill/ incineration)	84
Saves space in my waste bin/ in home	35
Good for environment/ Saves resources	90
Reduces “pollution”	70
Good for the economy	53
Good for future generations/ children	80
Feel guilty if don't/ better if I do	42
Because it's easy/ no extra effort	51
Because my friends and neighbours do	5
Other (please specify)	1
Nothing – don't do it	1
Don't know	1

Table 5.5 provides a listing of the percentage of responses from Q23 where respondents “tick all that apply” to what motivates individuals to recycle. Perceived consequences (Pc) relates to an output or something that happens due to recycling. From Table 5.5 the responses “reduces rubbish to landfill” (84% of respondents), “reduces pollution” (70% of respondents) and “saves space in the bin” (35% of respondents) were considered by the researcher to be associated with an output or perceived consequence. Importance of recycling is more likely to be associated with producing an output than interest in recycling and Q4 was selected by the researcher as the proxy representing perceived consequence.

Conversely evaluation of the consequences of recycling to the individual (Ec), is more associated with an outcome, which from the responses from Table 5.5 are less specific i.e. “good for the environment” (90% of respondents), “good for future generations” (80% of respondents) and “good for the economy” (53% of respondents). In other-words, the evaluation by the individual regarding the

consequence of recycling is the benefits to the environment, society and the economy. In this regard, interest in recycling (Q8) was considered by the researcher to be more likely associated with outcomes (Ec) than outputs (Pc).

The associations from Q4 and Q8 with Q23 however may be challenged in that interest in recycling could be associated with saving space in the bin and, recycling is important as it is good for the environment. The questions are however, proxies and therefore, a question directly relating to perceived consequences and evaluation of consequences would have provided a clearer interpretation.

In addition, other factors may also influence the cognitive process in developing attitudes for not recycling. The percentage of responses from Q11 which includes reasons for not recycling is set out in Table 5.6 below.

Table 5.6 Reasons for not recycling (% from Q11) n= 506

Q11. Why don't you recycle? <i>Please tick all that apply</i>	% of respondents
I cannot be bothered	20
I am too busy	0
I do not see the point of recycling	20
I do not know how to recycle	0
Other – Specify	60
Don't know	0

From Table 5.6 reasons for not recycling may include apathy (cannot be bothered), time constraints (I am too busy), recycling being too difficult (I do not know how to recycle), and scepticism (Don't see point in recycling). Other responses included lack of/no storage for containers (space) attracts vermin and odours from containers. These reasons for not recycling may be perceived or actual barriers to participation; however, what this does indicate is a low level of self-efficacy and perceived level control by the individual over their ability to recycle.

2. Affect

The category concern was used as a measure on a 4-point scale to assess the emotional response or ‘affect’ from respondents against four environmental categories. These categories included concern over global climate change on the individual and the next generation, disposal of rubbish that is not recycled local pollution in their area.

Table 5.7 Concern for environmental issues (% from Q1) n = 506

Question	Not At All Concerned	Not Very Concerned	Fairly Concerned	Very Concerned
The effect of climate change / global warming on <u>your life</u>	2	14	45	39
The effect of climate change / global warming on <u>your children's lives i.e. the next generation</u>	1	4	23	70
The amount of waste / rubbish households dispose of and don't recycle / reuse	1	4	33	61
Pollution in your local area	1	16	41	37

Table 5.7 shows the percentage of responses to the four categories, where high levels of concern based on the combined percentage “very concerned” and “fairly concerned,” was expressed for all categories. This may reflect the general concern by individuals over the environment. However, almost twice the percentage of respondents cited being very concerned over the effect of climate change of future generations and the amount of rubbish that is not recycled over the other two categories. This may be indicative of a perceived linkage between the long-term effects of climate change being associated with unsustainable forms of waste disposal such as landfill. It also indicates a heightened concern for household waste recycling with links to the perceived consequences represented by importance of recycling. Pollution in the local area, however does not seem to attract the same levels of very concerned individuals compared with disposal of waste to landfill. This

may be due to pollution not being specific to any phenomena e.g. noise, air pollution, water, dog fouling or that individuals consider pollution in their area an acceptable aspect of community life. Taking into account the percentage of very concerned and concerned responses; however, individuals were as concerned over local pollution as they were for the effect of global climate on themselves. It is difficult to identify from the general percentages of responses whether cognitive attitude or affect is the main driver of intention.

3. Social factors

Social factors, described earlier in the Chapter, include two components, which are social norms and role. Dealing with the first component, social norms are “what is normally done” or perceptions by the individual about what those in a social group would do in a social situation (Cialdini et al, 1991). The other social component ‘role’, according to Triandis (1977), is associated with sets of behaviours that are considered appropriate for persons holding particular positions in a group. Neilson and Ellington (1983) identified that community social influence may play a major part in household recycling behaviour. Deutsch and Gerrard (1995) identified two forms of social influence, which include ‘informational’ and ‘normative’. Therefore based upon the level of understanding of the Council’s services and knowledge of recycling, it was suggested that social influence to recycle may be largely informational. This however, does not rule out the presence of normative social influence.

Descriptive social norms

Descriptive social norms provide a greater depth of understanding of the culture in the community and can be very powerful in terms of influencing attitudes and behaviours (Cialdini et al, 1991). The survey questions used to reflect social norms were those that asked respondents what percentage of people in their neighbourhood they estimated recycled on a regular basis (Q19) and how often their

neighbours used the household recycling collection service (Q16). These two questions illustrate how the respondent perceives the frequency of activity among their neighbours and hence provides a proxy for the degree to which it is considered a social norm. The results for the percentage of people in their neighbourhood that respondents considered recycled on a regular basis are presented in Table 5.8. Approximately 47% of all respondents perceive that more than 75% of people in their neighbourhood recycle regularly. More than 75% of the survey respondents felt that more than half of the people in their neighbourhood recycled regularly, with only 16% considering less than half recycled.

Table 5.8: Perceived recycling activity in your neighbourhood (Q19) n= 506

Question	Up to 25%	26-50%	51-75%	More than 75%
What percentage of people in your neighbourhood would you estimate recycle on a regular basis?	4.3	11.8	29.1	46.9

The results from Q19 and Q16 (concerning how often respondents thought their neighbours used the household recycling collection service) indicate that respondents consider regular recycling to be a more common activity than not recycling, and as such for it to be the social norm to recycle.

Table 5.9: Claimed recycling frequency for self and neighbours (Q15/16) n = 506

CATEGORY	Claimed for self (Q15)	Perceived for neighbours (Q16)
Every week	88%	82%
Every other week	3%	4%
One in a while	5%	3%
Never	3%	3%
Not provided	2%	7%

Columns may not total 100% due to rounding

In addition to being asked how frequently respondents considered their neighbours recycled (Q16), they were also asked to state their own claimed recycling practice or ‘habit’ (Q15). As Table 5.9 shows, the majority of respondents claim to recycle every

week, with a similar perceived level of participation from their neighbours. This similarity suggests a correlation between individual and perceived social norms. This relationship was explored further through semi-structured interviews in Phase 3 of the research.

Prescriptive social norms

Question 2 looked at the prescriptive norm in terms of “who should be responsible for what happens to rubbish” and is illustrated in Table 5.10. This question allowed multiple responses as for Q23 and Q11 i.e., “tick all that apply”, which would explain why the percentage totals in Tables 5.10 (and 5.6, 5.5) equate to more than 100%.

Table 5.10 Prescriptive Social Norms (from Q2) n= 506

Every hour, enough rubbish is put into household bins, to fill the Albert Hall. Who do you think should be responsible for what happens to this rubbish?	% of respondent
The Government	40
The Council	46
Businesses	33
Everyone has a responsibility	86
Don't Know	1

Over 86% responded “everyone has a responsibility” with just over two fifths suggesting the Council should be responsible, which suggests a presence of moral rules within the community which proscribe its social culture.

Role

Role reflects the extent to which an individual believes someone of their social standing, should behave. This is closely linked with the prescriptive norm described earlier and has been represented as a singular group which includes normative beliefs as “perceived social norms”. Roles however may change depending on their social environments. To illustrate the difference between role and social norms,

Triandis (1977) proposed that in traditional societies roles are shaped to become consistent and conflict is avoided between the group members. However in modern societies the doctrine is based on the continual challenging of roles. Therefore in the first example the role of individuals in a group are set whereas in the second example the role may continually change; however the social norm may stay the same in both examples. Role also includes rights and responsibilities, including perceived effectiveness to influence decisions at a community level.

Table 5.11 Role from influence on community decision-making (Q34) n= 506

Do you agree or disagree that you can influence decisions that affect your area?	% of respondents
Strongly Disagree	5
Disagree	18
Not sure	41
Quite Agree	31
Strongly Agree	4

In terms of the influencing decisions within their community only one third of respondents seem to agree (“quite agree” and “strongly agree”) in accordance with Table 5.11. Conversely, over 40% of respondents were not sure whether they could influence community decision-making suggesting that there is a split between individuals who play an active role in the community and those who do not. It is suggested that those who play an active role in the community may include recycling of household waste part of what constitutes good community activity. This will be explored later in the thesis. Roles may also be associated with ‘social diffusion’ (Everett and Pierce, 1992), which is the influence on an individual from family and friends. This influence which differs from the influence at community level was examined as an optional answer to *“what, if anything, motivates you to recycle”* (Q23). The percentage of respondents claiming *“neighbours and friends”* were an

influence to recycle their waste was 5%. This suggests that social diffusion may not be a major influence on recycling behaviour.

4. Personal norms and self-identity

Personal norms and self-identity are also predictors of intention, along with social norms, role, affect and attitude, according to Triandis (1980).

Personal norms

It was highlighted in Chapter 2 that group norms, which are adopted individually but not necessarily within the entire community, become a 'personal norm'. Personal norms represent the feeling of personal obligation regarding the undertaking of a particular behaviour, in this case household waste recycling. The presence of a personal norm was identified from responses to motivations of behaviour (Q23) from Table 5.5 where "feeling guilt" for not recycling, and "feeling better" when recycling, were expressed. Over 40% of respondents displayed a personal norm based on this question, suggesting that, in addition to a strong social norm in operation within the respondent group, there may be personal obligations on the individual toward household waste recycling.

Self-identity

In terms of self-identity, this component is associated with the degree of congruence between the individual's self-perception and the characteristics they associate with that particular behaviour (Gagnon et al, 2003). Unfortunately there were no questions (single or multiple response) that provided a proxy for self-identity.

5. Habit

Habit, like facilitating conditions, is a separate influence on behaviour in the TIB. It is associated with the process of routine behaviours, thereby making them less visible to rational deliberation. Past experience of a recycling activity is identified in the TIB

as a key influencer to habit formation according to Triandis (1977). Routine decisions are in effect relegated to the realm of low cognitive effort resulting in automatic behaviour, guided by heuristic cues. Habitual behaviour is represented in general terms by Q15 and is illustrated in Table 5.9. Frequency of usage for specific materials is provided in Table 5.12, which illustrates habit from a material specific perspective.

Table 5.12: Frequency of recycling by material (from Q22) n = 506

HOW OFTEN RESPONDENTS RECYCLE EACH MATERIAL (%)					
	Every time	Most times	Some times	Never	N/A or Not provided
Q22.1 Paper (e.g. newspapers and pamphlets)	83	10	4	2	1
Q22.2 Card/cardboard (e.g. cereal boxes)	81	11	4	2	2
Q22.3 Glass (e.g. bottles and jars)	78	15	3	2	2
Q22.4 Food and drink cans/tins	69	17	8	4	4
Q22.5 Plastic containers (e.g. milk/drinks bottles)	79	12	4	3	2
Q22.6 Textiles (e.g. clothing)	26	21	29	10	14
Q22.7 Food waste for compost	15	5	11	50	20
Q22.8 Garden waste for compost	26	14	16	30	14

From Table 5.12, nine in ten residents recycle paper, card, glass, tins / cans and plastic containers most of the time, with the majority of these saying they do so every time. As the service for kerbside recycling is provided on a weekly basis then the response “every time” would be interpreted as ‘every week’. However, the distribution of responses from stated frequency of recycling textiles and garden waste was widely distributed across all four response categories. This suggests that recycling of these materials requires more effort than that of the 5 mainstream materials in Q22.1 to Q22.5, which is supported by the fact that textiles and garden waste are not weekly kerbside collected materials²³. In addition, it may be presumed

²³ Garden waste collected via appointment with collection based on demand on the service, textiles are collected through the Council bring bank service and are provided on kerbside

that not all respondents have a garden. However, respondents were not specifically asked whether they had a garden or access to one. What Table 5.12 does illustrate is a regular frequency pattern for kerbside collected materials and an irregular frequency for textiles and food/garden waste. However, regular reported frequencies do not confirm that a habit is in operation and further probing of information is required to assess this component.

6. Facilitating conditions

Facilitating conditions includes variables that are ‘contextual’ and ‘spatial’. The former category concerns areas such as awareness of services, convenience and service satisfaction plus the type of materials collected by the service in terms of infrastructure and information on the service.

Awareness

Awareness includes knowledge of recycling in general (Q7) and awareness of local recycling services in operation and where to take these materials (Q12 and 13) Barr (2001) referred to general knowledge regarding recycling as ‘abstract’ knowledge and awareness of how to recycle as ‘concrete’ knowledge .

Table 5.13 Awareness of services (from Q7) n = 506

How would you rate your knowledge of how to recycle on a scale of 1 to 5, where ‘5’ is know a lot and ‘1’ is know nothing?	% of respondents
1 Know nothing	1
2	5
3	26
4	46
5 Know a lot	20

Table 5.13 shows the pattern of concrete knowledge or local awareness which suggests that there are approximately two-thirds of the respondents based on a combined percentage of the score 4 and 5, who consider that they know how to basis via other organizations e.g. charities

recycle. Question 7; however, did not specifically pertain to awareness of recycling services, or whether this was recycling at the kerbside, using the HRC etc. This aspect was covered in Q12, Table 5.14, which provided a different percentage of responses pertaining to awareness.

Table 5.14: Awareness and use of local facilities (from Q 12 & 13) n = 506

Recycling Services Perceived To Be Provided In Area And Usage (%)		
Q12 Which of the following recycling services are provided in your area? Please tick all that apply Q13 which services do you use? Please tick all that apply	Available (Q12)	Used (Q13)
Doorstep/kerbside recycling collection of one material only	11	9
Doorstep/kerbside recycling collection of more than one material	94	78
Flats/communal recycling facility	7	2
Public recycling bank	65	38
Recycling centre at household waste site ('tip')	70	56

From Table 5.14 this suggests that in accordance with Q12 there is a high proportion of respondents who are aware of the kerbside recycling collection service, with a lesser but significant proportion aware of bring site/HRC recycling. In comparison with the response to Q7 from Table 5.13, it is suggested that the 66% reflects a combined response for recycling awareness, which includes kerbside, bring site, HRC and communal facilities. In addition, from Table 5.14, Question 13 includes usage of the recycling facilities/services provided. This suggests that 87% of respondents use the kerbside service followed by use of the Household Waste Recycling Centre (HRC) at 56% and at 38% usage of 'bring banks'. Note Questions 12 and 13 are multiple response questions and the totals do not equate to 100%.

Information on service

Provision of information is a key facilitating condition in enhancing awareness and assists in raising expectations of service users regarding quality of service. Table 5.15 provides a list of responses to a series of questions regarding sources of information on recycling.

Table 5.15: Receipt of Information (from Q26) n= 506

Q26. Where have you seen/heard promotion on recycling in the last 6 months? Please tick all that apply	% of respondents
Television	51
National newspaper	28
Local newspaper	49
Radio	11
Poster	13
Local supermarket	18
Leaflet /letter delivered to your home	73
Other/Don't Know	4

The questions from Q26 are multiple response-based and provide a means to identify which of the information sources regarding household recycling are the most popular among residents. In accordance with Q26, the survey identified that approximately two-thirds of respondents claim to have seen/heard about recycling initiatives in the last 6-months. However 73%, who have seen/heard some form of advertising/promotion, have received information by letter or leaflet. An interesting observation is that there is a 50:50 split between information received by televised media and the local news media.

As the Council does not advertise its services through televised media then this may be associated with the Central Government campaigns on recycling such as the "Recycle Now" adverts. Other forms of media advertising are undertaken by the Council including use of local newspapers, posters and radio interviews, with the most common being calendars and information leaflets delivered to the property, which is reflected in the 73% of responses. In accordance with Q28 and from Table 5.16 regarding understanding of information, this suggests that overall, residents have little difficulty in understanding the information provided. RBWM in general does not have a large transient community compared with other local authorities, with a large proportion resident in the Borough for over 10 years.

Table 5.16 Understanding of Information (From Q28) n= 506

Q28: Respondent rating of how easy or difficult recycling information was to understand – on a scale of 1 to 4 where 4 is very easy and 1 is very difficult - %		
Media	Quite/very difficult	Quite/very easy
Leaflet (397)	5	92
Press release/article (131)	5	91
Council newsletter/magazine (332)	3	91
Website (52)	16	68
Other (4)	20	63

Therefore awareness of services and understanding were not considered a barrier to recycling, but are nevertheless an important facilitating condition. The lower percentage of responses for the website, compared with the percentage of responses for the other categories may be also be indicative of the number of residents using or who have access to the internet.

Table 5.17 shows the percentage of responses as to what would encourage greater recycling, in which over 50% of the respondents stated that better information about what and how to recycle. In addition, 45% identified “easier to use services”, which suggests that the infrastructure provided for recycling (55L boxes) may not be adequate for a large percentage of individuals. Finally, the kerbside recycling collection service requires pre-sorting of recyclables by the householder; therefore if all recyclables were placed in a single container, no sorting of recyclables would be required. This would encourage greater participation and may also explain the 45% suggesting easier- to- use recycling services. In this regard, provision of infrastructure and more information on what materials can be recycled would be a key factor in encouraging greater levels of recycling for a large percentage of individuals. There are; however, a similarly large percentage of respondents who appear to be content with the service provided suggesting a difference in motivating factors. This was explored in greater depth in successive chapters.

Table 5.17 Reasons to recycle more

Q24 What, if anything, would encourage you to recycle more / start recycling? Please tick all that apply	
Easier to use services.	45
Better information about what / how to recycle.	51
Financial incentive to recycle.	25
Other – specify	8
Nothing	11
Don't Know	10

Convenience and other logistical factors

Perceived convenience was identified by WRAP as a key condition in household waste recycling (WRAP, 2008). The observations associated with the facilitating condition recycling convenience are shown in Table 5.18.

Table 5.18 Recycling Convenience (From Q6) n= 506

How convenient is it for you personally to recycle your household waste?	% of respondents
Very convenient	37
Fairly convenient	49
Not very convenient	10
Not at all convenient	2
Don't know	2

With regard to the responses from the RBWM survey approximately 85% of respondents regard the recycling service as “fairly convenient” to “very convenient”. Also convenience may be applied to other logistics factors such as time convenience in addition to physical convenience. This is reinforced from responses to Q23 (Table 5.6) where 51% state their motivation to recycle is due to it being easy to do and not requiring any extra effort. As from the previous section regarding reasons to recycle more, convenience may be linked to the need for easier-to-use recycling services. This may be associated with those individuals who do not find the service convenient or fairly convenient based on the infrastructure and service provided. In this regard,

pre-sorting of household waste and placing this into recycling boxes would for certain individuals be considered less convenient than placing all recyclables into a single container such as a wheeled-bin.

Taking the last three sections into consideration regarding facilitating conditions, there appears to be a strong link between reasons to recycle more and infrastructure and service provision for approximately 50% of respondents. This suggests that the infrastructure, service and behaviour relationship (Timlett and Williams, 2011) is a strong influencing factor. However there are a similar percentage of respondents who do not perceive infrastructure and service to be a major influencing factor to recycle. This suggests that the role of facilitating conditions as a moderating component of behaviour may not apply to all individuals and that some individuals may express less restriction to recycle than others. This was explored in greater depth in Chapters 6 to 8.

Socio demographic groups

The claimed behaviour survey (RBWM, 2006) also included the collection of socio-demographic information for the Council's View Point Panel. It was however concluded in Chapter 1 of this thesis, that the investigation of behavioural determinants would not include the use of socio-demographic factors. To support this decision the homogeneity of the response percentages observed may be associated with homogeneity of the households surveyed, but equally may be associated with other factors. However the lack of homogeneity in housing stock makes it difficult to assess this. Therefore, the influence of socio-demographic factors on recycling behaviour in RBWM was suggested as being of minimal benefit to the research due to the homogeneity of responses based on socio-demographic groupings. This suggestion is supported based on RBWM being a relatively affluent borough with little variation in housing stock compared with other Councils e.g.

London Boroughs, which have a wide variance of socio-demographic factors such as a high percentage of flats and low levels of employment, education etc.

The next section looks at actual behaviour as represented by other Council surveys and was used for comparison with the claimed behaviour observations to assess the degree of over/understating behaviour. This was also used to assess the degree of confidence in the findings from the claimed behaviour survey.

5.5 Comparison of claimed with actual behaviour

Information from the claimed behaviour survey was used for comparison purposes with the household kerbside recycling participation survey representing actual behaviour and described in Chapter 4. It was identified that comparison of actual behaviour based on participation rate with claimed recycling behaviour based on Q10 was not suitable as the claimed behaviour from Q10 does not specify whether this includes kerbside recycling, which is specific to the household participation survey. Therefore in order to provide a comparison of claimed kerbside recycling behaviour with actual kerbside recycling behaviour the results from Q13 (Table 5.14) were used. These are presented in Table 5.19.

Table 5.19: Survey results (actual vs claimed) based on sample size

Source	Sample size	Confidence Interval	% of responses	Range within precision (%)
Claimed kerbside recycling of 1 material and > 1 material (from Q13)	506	95%	87%	83.00 and 91.00
Actual behaviour (from household Participation survey)	7,069	95%	79%	77.75 and 80.25

Note: only the answers to Q13 for kerbside were used

From Table 5.19 the results suggest that 87% of respondents who claim to recycle at kerbside 1 or more materials, compared with 79% who actually recycle at the

kerbside based on the participation survey results. Claimed and actual kerbside recycling behaviour were next compared in terms of their representativeness and sampling error. The WRAP Good Practice Guide (WRAP, 2006b, p59 to 62) suggests a sample of approximately 1,100 is adequate for waste related surveys regardless of the size of population as long as the sampling is carried out correctly with no bias.

The number of questionnaires issued in the 2006 RBWM survey was 1,042 of which 506 completed returns were received. According to the WRAP guidelines a sample of 1,100 provides a precision of $\pm 3\%$ at the 95% confidence level. Therefore from a return of 87% of respondents claiming to recycle from a sample of 1,100 this results in a 95% confidence that the actual percentage of authority residents claiming to recycle falls within a range of 84% to 90%. Therefore a sample of 506 respondents would provide $\pm 4\%$ precision at the 95% confidence level, which is still acceptable according to WRAP (2006b) guidelines.

For the household kerbside recycling participation survey, the sample size was based on a kerbside recycling collection round, which collects from 7,069 properties on a weekly basis. WRAP guidelines (2006 p 78 to 94) provides advice on monitoring scheme participation in which the rule of thumb is 1,100 households for adequate reporting of monitoring figures (participation/set out rate). Applying the sample size principles to the kerbside collection round (WRAP, *ibid*) this results in a $\pm 1.25\%$ level of precision. In this regard it may be stated with 95% confidence that the actual kerbside household recycling, based on the participation survey, is between 77.75% and 80.25%.

According to WRAP guidance (WRAP, *ibid*) in terms of sample representativeness emphasis is placed on homogeneity of the area with regard to housing type. A collection round or the area that one vehicle with one crew covers in one day should

be selected so that the round mirrors the social make up of the area being monitored in terms of housing type. It is also recognised that factoring in other socio-demographic factors on a collection round such as ethnicity, tenure and social grade although desirable is not a practical option for many local authorities (WRAP, 2006b p 81). The collection round selected for the household kerbside recycling participation survey (RBWM, 2006) was representative in terms of housing stock (see WRAP, 2006b p 81 to 83) as well as having a greater degree of precision than that of the claimed behaviour survey. This reflects a potential discrepancy in terms of measurement of precision; however it is impractical and costly to undertake surveys measuring claimed behaviour using the same size sample as participation. WRAP in their guidance document (WRAP, *ibid*) state that smaller sample sizes are viable however the results become less precise as the sample size gets smaller and may result in a trade-off between precision and cost for the survey.

In comparing claimed with actual behaviour, research conducted by Brook Lyndhurst and MORI (2002) suggested that people consistently 'over report' their environmental attitudes and behaviour in surveys when compared to actions they really take. Tucker (2003) also suggested that self-reported behaviours are more likely to reflect attitudes than that of behaviour. Studies conducted by Woollam et al (2003) whose research into the comparison of self-reported and actual recycling behaviour in Rhonda, Wales identified a 29% variance between claimed and actual behaviour. The research carried out for this project supports previous findings that claimed behaviour is over-reported compared to actual behaviour, although with a difference of 8% the level of over-reporting in this study is of a much lesser degree than that observed by Woollam et al (2003). However, since this exercise was conducted household waste recycling has become more established and the difference between claimed and actual behaviour appears to have reduced.

5.6 Conclusion

The questions from the 2006 claimed behaviour survey selected by the researcher as proxies adequately represented the TIB components with the exception of self-identity. There was also no scaled question which represented personal norms. However, the Council questionnaire was not designed on the TIB, which necessitated the researcher using a '*back end fit*' process for selection of specific questions as proxies to represent the TIB components as opposed to designing the questions specifically around the TIB model.

The observed trend from percentage of responses were generally highly positive in terms of level of importance, interest, concern, and perceived frequency of neighbourhood recycling. This suggests a heightened intention to recycle from the respondents surveyed. From a habit perspective, respondents claimed to recycle paper, card, glass cans and plastic bottles every time, with recycling of garden waste and textiles on a less regular basis. This may be indicative of the infrastructure provided for collection of materials with a weekly kerbside collection provided for paper, card glass etc., and garden waste and textiles collected via HRC and bring banks respectively. Service satisfaction for the recycling service overall is very good with over 70% satisfaction for refuse collection services (RBWM, 2005). In terms of knowledge, awareness and information over 65% are aware of the recycling service outside of the kerbside collection with a similar percentage expressing a high level of knowledge on how to recycle. This may be attributable to the concentrated information campaigns and consultation on services provided to residents, which together with infrastructure and service satisfaction correspond to the findings from Timlett and Williams (2011) regarding their ISB model.

The household waste recycling service provided in RBWM is convenient to residents with regard to materials collected through the kerbside service. In addition the partially commingled service adds to this convenience in that minimal pre-sorting is

required by service users. Effective monitoring of the waste and recycling contract and training updating of contractor operatives results in a low level of missed collections and increased satisfaction with the service. Residents are also highly aware of the recycling services provided and how to use them. This coupled with education and awareness campaigns by the Council are conducive to increase in positive behaviour, which is evidenced from the high levels of participation. However participation surveys only measure performance of the kerbside collection service.

The next stage in the research involved the setting up of sample groups from the 2006 survey to represent different types of claimed recycling behaviour. The sample groups were then statistically examined to see if they exhibited different characteristics in terms of responses representing determinants of behaviour. This was used to test the TIB in terms of its suitability as a framework to illustrate patterns of behaviour with regard to household recycling. The objective is to identify whether the same set of determinants of household recycling are present and whether they vary in proportion for each sample group. The next Chapter also looks at the statistical relationships associated with recycling behaviour to identify what the key factors are in the pattern of responses for each sample group and how this may be used to test the TIB.

CHAPTER SIX: Phase II - Quantitative analysis of household recycling behaviour

6.1 Introduction to the Chapter

This Chapter provides a detailed statistical analysis of the claimed behaviour survey data through the setting up of sample groups representing recycling behaviour preference or 'type'. The data from the sample groups were analysed using descriptive and inferential statistics in order to identify if there is any statistical difference between the sample groups for each respective TIB component. The information was then mapped onto the TIB model to illustrate differences in determinants of recycling behaviour in accordance with recycling behaviour preference. This provided a useful means in which to test TIB as a model for investigation of household recycling behaviour

6.2 Stages in the analysis

Raw data in the form of responses to the survey questions from the RBWM 2006 claimed behaviour survey was obtained from the Council's consultants BMG with permission from the Council. This data was then subjected to further treatment using 'select cases' in SPSS to eliminate missing values and don't know answers before being subjected to quantitative analysis. This was undertaken via a sequence of steps, which include:

- ◆ Preparation of sample groups with each group representing recycling behaviour based on household recycling preference;
- ◆ Identification of behavioural determinants of household recycling for each sample group;

- ◆ Illustration of the behavioural patterns of household recycling for each sample group in accordance with the TIB model;
- ◆ Comparison of the pattern of behavioural determinants of household recycling between sample groups;
- ◆ Use of significance testing to confirm whether the difference in the proportion of respondents between the sample groups for each behavioural determinant (TIB component) are produced purely by chance;
- ◆ Use of regression analysis to identify the key determinants of household recycling behaviour.

6.3 Quantitative Analysis of data from 2006 claimed behaviour survey

Detailed examination of the 2006 survey data commenced with the selection of a proxy question from the 2006 survey to represent claimed behaviour from which a set of sample groups based on preference of recycling behaviour were created.

Analysis of the data included a description of behavioural determinants of household recycling for each sample group followed by statistical analysis involving the use of significance testing using Confidence Intervals to determine statistical differences between the sample groups for each proxy based on the percentage of responses.

6.3.1 Method for analysis of claimed behaviour

Selection of framework

A framework was illustrated in Chapter 5, shows the TIB components which represent determinants of household recycling behaviour. Figure 6.1 provides an illustration of the TIB components based on the selected proxy questions from Table 5.1 Chapter 5, which were selected from the 2006 claimed behaviour survey.

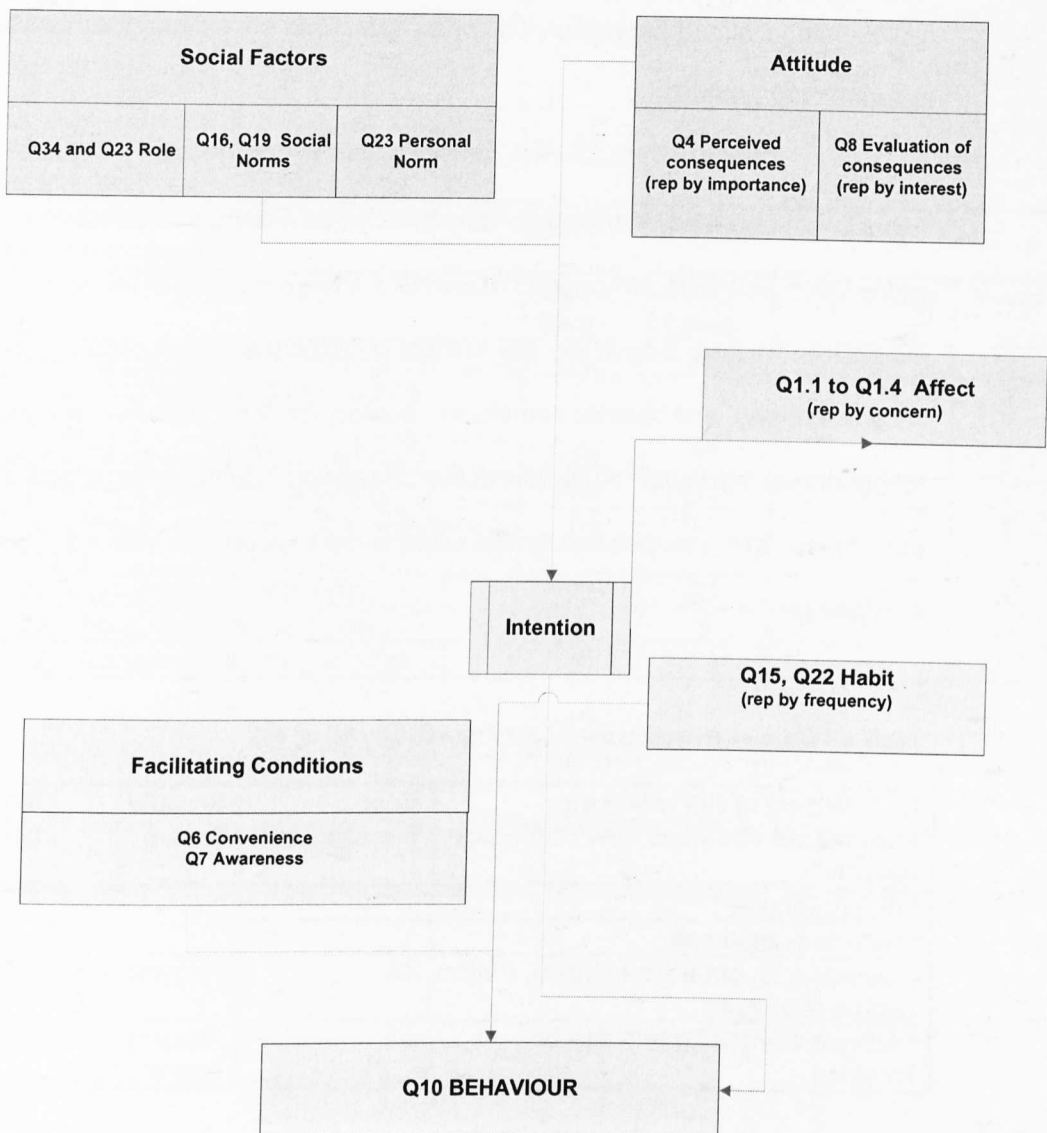
Almost all of the TIB components were represented by proxy questions from the 2006 survey, with the exception of the self-identity component. There are also no proxy questions representing intention as this is the resultant of the TIB components attitude, norms (social and personal), self-identity, role and affect. Analysis of the data and the findings from this analysis is set out in the following sections.

Data preparation, cleanup and selection of statistical procedures

Prior to carrying out statistical analysis the data was firstly treated using 'select cases' in SPSS to eliminate missing values, "don't know" and "not applicable" responses from the data. This was followed by recoding of reverse phrased questions to avoid obtaining negative values on analysis.

Due to most of the proxy questions from the claimed behaviour survey being structured as 'Likert' (1932) type scales (see Chapter 5), the data from this survey is 'ordinal' or ranked in accordance with the component being measured. This differs significantly from 'continuous' or interval type data which requires different types of statistical analysis. Ordinal data is analysed using non-parametric tests, therefore measures such as mean, standard deviation, Pearson correlation test and linear regression, which are typically associated with testing of continuous data are not applicable.

Figure 6.1 Expanded TIB framework including proxy questions



Non-parametric tests include Spearman's correlation, use of confidence intervals based on percentages or 'proportion' and categorical regression. The test involving use of confidence intervals is used for significance testing to identify differences in data between samples. The use of the confidence interval in the context of the analysis of data from the claimed behaviour survey is covered later in this Chapter.

Selection of sample group for quantitative data analysis

Prior to the preparation and analysis of sample groups representing claimed behaviour based on preference of recycling behaviour, an exercise was conducted to

identify which proxy question from the 2006 Council survey was more appropriate for representing claimed behaviour. The proxy questions considered for this exercise included Q10 and Q22.

Table 6.1 shows the percentage of respondents' for claimed behaviour in accordance with Q10. Although Q10 provides a large number of responses at one extreme for 'recycle everything' the number of responses at the other extreme 'recycle nothing' and 'recycle sometimes' are too small for statistical analysis (3% of respondents). However, by removing the categories 'I do not recycle' and 'I recycle sometimes' this provided two similar sized sample groups 'recycle a lot' and 'recycle everything'.

Table 6.1 Claimed recycling behaviour (from Q10 by %) n= 475

Q10. Which of the following statements describe how much you recycle?	% of respondents	Sample Group	% of respondents
I do not recycle	1		
I recycle sometimes	2		
I recycle a lot but not everything that can be recycled	44	Recycle a lot	44
I recycle everything that can be recycled	53	Recycle everything	53

Table 6.2 represents the percentage of respondents' in accordance with recycling frequency by material recycled. The distribution of the percentage of responses for the first five materials from Q22.1 to Q22.5 is heavily biased toward recycling "every time". This percentage may be as a result of these materials being collected through the kerbside programme and not just through bring sites or HRCs as for the materials recycled in Q22.6 and Q22.8. The percentage of responses for Q22.6 and 22.8 however contain a better distribution for the development of more than two statistically representative sub-sample groups. Q22.6 was selected as a potential proxy for behaviour as it can be argued that recycling of textiles requires greater effort than the kerbside recycling of materials illustrated in Table 6.2 for Q22.1 to

Q22.5. Conversely, Q22.8 relates to recycling of garden waste which may not be possible for all residents to participate in.

Table 6.2: Frequency of recycling by material (from Q22 by %) n= 506

HOW OFTEN RESPONDENTS RECYCLE EACH MATERIAL (% of respondents)				
	Every time	Most times	Sometimes	Never
Q22.1 Paper (e.g. news and pams)	83	10	4	2
Q22.2 Card/cardboard (e.g. cereal boxes)	81	11	4	2
Q22.3 Glass (e.g. bottles and jars)	78	15	3	2
Q22.4 Food and drink cans/tins	69	17	8	4
Q22.5 Plastic containers (e.g. milk/drinks bottles)	79	12	4	3
Q22.6 Textiles (e.g. clothing)	26	21	29	10
Q22.7 Food waste for compost	15	5	11	50
Q22.8 Garden waste for compost	26	14	16	30

In addition Q22.7 relates to composting of food waste, which may result in confusing of home composting with composting of food waste as seen by 50% of responses stating “never”. It may also indicate that 50% of respondents do not recycle their food waste.

Development and analysis of sample groups

Splitting the responses to Q22.6 yielded four sub-sample groups as shown in Table 6.3, of which groups 1, 2 and 3 are of similar size. Group 4 however, although being the smallest group, was considered large enough in size to be statistically representative.

Table 6.3 Sample group based on textiles recycling (from Q22.6) n= 433

Group	Description: How frequently do you recycle textiles	Group Size (No of cases)	Percentage
1	Every Time	133	31%
2	Most Times	102	24%
3	Sometimes	148	34%
4	Never	50	11%

Prior to conducting detailed statistical analysis on the above sample groups, a cross-tab analysis was conducted to explore consistency in respondents' answers, which is illustrated in Table 6.4.

Table 6.4 Frequency analysis behaviour group (from Q10) n=475

Q10 \ Q22.6	Never	Some times	Most Times	Every time
Recycle a lot	60%	60.3%	51.6%	32.6%
Recycle everything	40%	39.7%	48.4%	67.4%
Total	100%	100%	100%	100%

Table 6.4 shows that the highest percentage of responses for Q10 “recycle everything” is associated with “every time” for Q22.6 at 67.4%. Conversely, it is observed that the highest percentage of responses for “recycle a lot” re Q10 is associated with “sometimes” for Q22.6 at 60.3%. This pattern of responses suggests that the responses to Q10 are consistent with that of Q22.6 and indicate a potential suitability of Q22.6 or Q10 as a sample group. However, the Q10 sample group directly represents claimed behaviour, whereas Q22.6 represents the behavioural determinant habit based on frequency. In addition although Q22.6 provides 4 sample groups, this reduces the chance of yielding statistically significant differences between the sample groups. The sample groups developed from Q10 provide 2 groups and analysis of data was considered to be more powerful as it was easier to understand and representative of claimed behaviour unlike Q22.6.

6.3.2 Statistical testing of data

Two samples were prepared based on the responses from Q10 which were termed the “recycle a lot” and the “recycle everything” sample groups respectively. The pattern of the percentage of responses from each sample group for each TIB proxy question were then examined using Confidence Intervals and Significance testing.

Use of Confidence Intervals and significance testing for two sample groups

As the data is ordinal it is not feasible to determine CI around the variability of the data within each sample, as the distribution of the data does not approximate to a normal distribution as that for continuous data (Cliff and Keats, 2003). Confidence Intervals however can be used to compare the differences between samples based on their percentage of responses (Gardner et al, 1989). This enabled the researcher to ascertain within statistical limits the true population value for the difference in the between the sample groups for each respective parameter tested. These statistical limits are based on the degree of certainty as to where the value of the difference between the sample groups lies.

Confidence Intervals based on percentages between two samples at the 95% level are given by the following formula according to Gardener et al (1989).

$$(p1-p2) \pm 1.96 \sqrt{\frac{p1(100-p1)}{n1} + \frac{p2(100-p2)}{n2}}$$

Where: $p1$ = percentage of responses from "recycle everything" sample group

$p2$ = percentage of responses from "recycle a lot" sample group

$n1$ = population of sample group "recycle everything"

$n2$ = population of sample group "recycle a lot"

The above equation provides two sets of values based on $(p1-p2) + 1.96 * \sqrt{\quad}$ and, $(p1-p2) - 1.96 * \sqrt{\quad}$ where +1.96 and -1.96 represents the upper bound and lower bound of the confidence interval. This is based on 95% of observations from a standard normal distribution being between -1.96 and +1.96. The larger the CI number the wider the interval (e.g. $\pm 2.58 = 99\%$ CI) as the width of the CI depends on the standard error of the sample mean. Even though the data from the survey is

ordinal and the use of a mean is not applicable, as the data does not follow a normal distribution, the calculation of the standard error of a difference in proportions or in percentages follows the same logic as the calculation of the standard error of two means (BMJ, 2011).

Interpretation of results from 95% CI testing

The calculation of the CI may yield either both positive, both negative or, a positive and negative value. These values represent the range as to where the true value of the difference between the two proportions (percentages) from the sample groups lie. In other-words the percentage may be + 5% or – 10% of the difference in which case both a positive and negative value is obtained from the calculation. This indicates that the difference between the two proportions contains the value zero in that range (e.g. +5%, 0, -10%) which infers that there is no statistical difference between the two sample groups for the parameter under investigation. If the confidence interval yields two values that do not contain zero (i.e. they are both +ve or both –ve values) then this infers that there is a statistical difference between the two sample groups for the parameter under investigation. A worked example for calculating the 95% confidence Interval between two samples is provided in Appendix 2.

Hypothesis testing

Confidence intervals may also be referred to as significance levels in which the 95% CI is referred to as the 5% significance level. Significance levels are used for hypothesis testing to confirm whether the findings from the analysis of the data are produced purely by chance or by variations in the sample. A statistical hypothesis provides a statement about the sample and the validity of the hypotheses are tested by setting up two hypotheses and using the sample data to decide which of the hypotheses is true. The Null Hypothesis (H_0) is regarded as the default position in which “there is no statistically significant difference between the two measured

parameters". With regard to comparison of percentage of responses between each sample group for each proxy question under investigation, a positive-positive or negative-negative result based on significance testing suggests that there is a difference between the sample groups for a particular parameter and the H_0 would be rejected. The Alternative Hypothesis (H_1) suggests that "there is a statistical difference between the two parameters under investigation". In addition, H_1 may be either directional, where the estimate differs and is termed a 'one-sided' test. Conversely H_1 may be non-directional where no specific direction in the difference between the sample groups is imposed and is termed a 'two-sided test'. For the proxy questions under investigation there is no specific direction between the two sample groups and the test is referred to as two-sided.

Probability of making the wrong decision

Errors may be made in hypothesis testing include rejecting H_0 when it is true or, rejecting H_1 when it is true, and are referred to as type I and type II errors respectively. The probability of making a type I error equates to the cut-off probability established for the test e.g. 0.05 based on 5% (the significance test), for rejecting H_0 . The probability of making a type II error however is unknown as its calculation depends on knowing the true difference. The probability of making a type I error may be reduced by testing at the 1% significance (99% CI) level, however significance testing at the 1% level is normally undertaken for experimental analysis of data and is not normally used for analysis of survey data due to the data being ordinal and the analysis of the data is for explanatory purposes. The following steps provide a sequential approach to hypothesis testing as used in this thesis.

1. Calculate the 95% confidence interval for the difference between those respondents who "recycle a lot" and those who "recycle everything".
2. What is the null hypothesis (H_0)?
3. What is the alternative hypothesis (H_1)?

4. If the values from the confidence interval are both positive or both negative at the 95% level (5% significance) then can the null hypothesis (H_0) be rejected

A worked example of hypothesis testing is included in Appendix 2 with the worked example of the use of confidence interval calculation.

6.3.3 Analysis of data by TIB component

Figure 6.1 illustrates the proxy questions representing each respective TIB component. Each proxy question was analysed by arranging in a table the percentage of responses to each respective proxy question (representing the TIB component) within each behavioural preference group. The percentage of responses for each TIB component e.g. recycling is very important, within the 'recycle a lot' sample group were then compared with the percentage of responses for the same TIB component for the 'recycle everything' group. This was used to provide initial observations such as 86% of those respondents who recycle a lot (sample group) consider recycling very important (TIB component), which is then compared with the corresponding percentage of respondents from the 'recycle everything' group for the same TIB component. However this does not provide an indication as to whether there is a statistical difference between the sample groups for the TIB component under investigation.

To address this issue significance testing was used at the 5% (95% CI) level in which where there is a difference i.e. where values are either both negative or both positive there is a 95% certainty that there is a real difference between the percentage of respondents who 'recycle everything' for a particular determinant and the percentage of respondents who 'recycle a lot'. For some components, the percentage of responses were initially combined to present the data for analysis in terms of a dichotomous set of responses based on a 'positive' or 'negative' response. An example of this may be illustrated from Q6 recycling convenience in

which the responses for 'fairly convenient' and for 'very convenient' were combined to provide a single positive response of 'convenient'. The 'not very convenient' and 'not at all convenient' responses were also combined to produce the negative response 'not convenient'. This was used as a first stage in the analysis to see whether there was a difference in the sample groups for the TIB component being investigated from a combined response perspective.

The data was also analysed from an individual response perspective e.g. for 'very convenient'. Presentation of the data is provided in the following sections via a series of cross tab output tables. Each table shows the dependent component 'claimed behaviour', represented by Q10 divided into the two sample groups, on the left hand side of the output table.

Arranged along the top of the output table is the respective proxy question representing a TIB component (e.g. convenience) and the levels of response e.g. 'very convenient'/'not convenient'. Values in terms of percentage of responses are placed into the cells in the columns of the output table together with the sample size associated with the response in parentheses. This provides the percentage of responses associated with a particular parameter within each respective sample group. Each table also includes the 95% confidence interval (5% significance). This information is presented for each respective TIB component commencing with cognitive attitude.

Cognitive attitude

Cognitive attitude includes the TIB components 'perceived consequences' and 'evaluation of consequences'. These TIB components are represented by the proxy questions recycling importance (Q4) and interest in recycling (Q8) respectively. A cross tabulation analysis for recycling importance against claimed behaviour is shown in Table 6.5 which shows that 86% of respondents from the 'recycle a lot'

group consider recycling very important, whereas 95% of the 'recycle everything' group consider recycling very important. Similar trends are observed between the two sample groups for fairly important. The significance test results however show two positive values for 'very important' and a negative and positive value for 'fairly important' and it is suggested that there we can be 95% confident that there is no statistical difference between the sample groups for the TIB component perceived consequences.

Table 6.5 Recycling importance from Q4 (n= 474)

		Q4 recycling importance (% of respondents)	
		Very important	Fairly important
Q10 Claimed behaviour (% of respondents)	Recycle a lot	86.1% (n=203)	13.9% (n= 20)
	Recycle everything	95.2% (n=228)	4.8% (n= 23)
Significance Testing	CI 95% (5% sig)	14.61 3.59	8.40 -26.60

Table 6.6 shows the percentage of responses regarding evaluation of the consequences or outcome of actions based on interest in recycling (Q8). The responses from Q8 were arranged into 5 levels or scores with 1 being lowest level of interest and 5 highest.

Table 6.6 Analysis recycling interest in recycling from Q8 (n= 364)

		Q8 recycling interest (% of respondents)	
		Interested	Not interested
Q10 Claimed behaviour (% of respondents)	Recycle a lot	58.9% (n=130)	13.4% (n=30)
	Recycle everything	77.2% (n= 193)	4.4% (n= 11)
Significance Testing	CI 95% (5% sig)	28.62 7.98	8.9 -26.19

It was assumed that a level 3 response score, which is a middle value between interested and not interested and was excluded from the analysis. The percentage of responses in Table 6.6 were combined into two groups with 'interested' representing the combined percentage responses for scores of 4 and 5 and 'not interested'

representing combined percentage scores of 1 and 2. The pattern of responses between the two groups is similar to that observed in Q4 for those respondents claiming not to be interested in recycling (combined score of 1+2). However there are a lower percentage of respondents who are interested in recycling across both sample groups for Q8 than that of Q4.

The significance test results from Table 6.6 show two positive values for interested but a negative and positive value was obtained for not interested. This suggests that there is a statistical difference between the sample groups based on those individuals interested in recycling; however there is no difference between the groups for individuals not interested in recycling, which was confirmed at the 5% significance level.

Comparing importance of recycling with interest in recycling for the sample groups, there is no statistical difference between respondents who are not interested in recycling and who consider recycling fairly important. However there is a difference between the sample groups for importance and interest for those who are interested in recycling and consider recycling important. There is also a higher percentage of respondents who consider recycling important over those who are interested. This suggests that importance of recycling carries a higher rating among respondents than interest in recycling. From a TIB perspective, the perceived consequences of recycling based on importance would therefore be a dominant factor over that of the evaluation of the consequences of recycling based on interest.

Affect

Affect was represented by four proxy questions Q1.1 to Q1.4 based on the degree of concern regarding certain environmental issues. Tables 6.7 to 6.10 show the variation of percentages across four areas of environmental concern representing the affect component of TIB. The percentage of responses for Q1.1 to Q1.4 were

combined into 2 categories representing 'concerned' (very concerned + fairly concerned) and 'not concerned' (not at all concerned + not very concerned). From Table 6.7 Concern does not vary significantly between the two sample groups for the percentage of those claiming to be 'concerned' or 'not concerned'.

Table 6.7 Impact on self from climate change (from Q1.1) n= 473

	Q1,1 How concerned are you about global climate change.on your life (% of respondents)		
		Concerned	Not concerned
Q10 Claimed behaviour (% of respondents)	Recycle a lot	81.6% (n = 182)	12.0% (n= 41)
	Recycle everything	88% (n= 220)	18.3% (n= 30)
Significance Testing	CI 95% (5% sig)	13.48 -0.68	10.29 -22.89

The significance test results from Table 6.7 show positive and negative values at the 5% significance level which suggests that there is no statistical difference between the sample groups.

Table 6.8 Impact on children's lives from climate change (from Q1.2) n= 469

	Q1.2 How concerned are you about global climate change on your children's lives (% of respondents)		
		Concerned	Not concerned
Q10 Claimed behaviour (% of respondents)	Recycle a lot	95.0% (n= 211)	5.0% (n= 11)
	Recycle everything	95.6% (n= 236)	4.4.0% (n= 11)
Significance Testing	CI 95% (5% sig)	4.54 -3.34	17.09 -18.29

From Table 6.8 there is a marginal difference in percentage of respondents who are concerned over the impact on global climate change on their children's lives over that of themselves. However, on significance testing this suggests that there is no statistical difference between the sample groups. Tables 6.9 and 6.10 respectively show the percentage of responses for 'concern over disposal of waste by households which is not recycled' and 'concern from local pollution'. The results are

presented as for the previous two categories using a combined “concerned” and “not concerned” approach.

Table 6.9 Concern from disposal of waste (from Q1.3) n= 471

	Q1.3 How concerned are you about amount of rubbish households dispose of and don't recycle (% of respondents)		
		Concerned	Not concerned
Q10 Claimed behaviour (% of respondents)	Recycle a lot	97.3% (n= 216)	2.7% (n= 6)
	Recycle everything	96.8% (n= 216)	3.2% (n= 8)
Significance Testing	CI 95% (5% sig)	2.60 -3.60	18.30 -17.30

Table 6.10 Concern from local pollution (from Q1.4) n= 456

	Q1.4 How concerned are you about pollution in your local area (% of respondents)		
		Concerned	Not concerned
Q10 Claimed behaviour (% of respondents)	Recycle a lot	81.6% (n= 177)	18.5% (n= 40)
	Recycle everything	83.6% (n= 200)	16.3.0% (n= 39)
Significance Testing	CI 95% (5% sig)	9.68 -5.68	14.51 -18.91

With regard to the degree of concern over the amount of waste households dispose of without recycling Table 6.9 suggests that the level of concern is similar between the sample groups. Table 6.10 presents a similar picture for concern over local pollution. Significance testing suggests that there is no statistical difference between the sample groups for both concern over waste and for local pollution. However, before concluding that affect does not present any difference based on recycling preference the percentages from the output tables (6.7 to 6.10) were revisited in terms of fairly concerned and very concerned. It was accepted by the researcher that the variation in those respondents who are not concerned is unlikely to change by examining the responses based on “not at all concerned” and “not very concerned”.

Table 6.11: 5% significance values for Q1.1 to 1.4

95 CI (5%)	Climate change - self	Climate Change - others	Waste	Pollution
Very Concerned	27.83; -0.43 (n= 115)	12.20; -7.00 (n= 181)	27.31; 5.49 (n= 180)	-40.93; -62.67 (n= 89)
Fairly Concerned	5.98; -20.58 (n= 105)	13.87; -17.87 (n= 55)	-2.14; -31.66 (n= 61)	19.63; -8.03 (n= 111)

From the above Table 6.11 it can be seen that for concern over global climate change in terms of the impact on the individual and on their children’s lives there is no statistical difference between the ‘recycle everything’ and ‘recycle a lot’ sample groups. This suggests that there is a 95% certainty that recycling behaviour preference is unlikely to vary regardless of the concern over global climate change. Testing of the data from the sample groups for concern over disposal of waste at the 5% significance for the ‘very concerned’ and ‘fairly concerned’ responses suggests that there is a 95% confidence that there is no difference between the sample groups. There is also an observed statistical difference between the sample groups for respondents who are very concerned over local pollution but no observed difference for those who are ‘fairly concerned’.

Based on the above results it is proposed that for the respondents surveyed there is a 95% certainty that there is a difference in recycling behaviour from respondents who are ‘very concerned’ and ‘fairly concerned’ over disposal by households of waste that is not recycled. This difference also applies to respondents who are ‘very concerned’ over local pollution. However, recycling behaviour is not affected by concern over global climate change. In this regard the influence of the affect component of the TIB on recycling preference is best illustrated where concern is expressed over disposal of waste that is not recycled.

Social norms

Social norms include normative beliefs which were represented by the proxy questions Q16 and Q19 and are presented in Tables 6.12 and 6.13.

Table 6.12 illustrates the level of perceived recycling activity of the respondent's neighbours for each sample group. As identified above in Table 6.12, the majority of respondents perceived the level of their neighbour's recycling is 'every week' across both groups. The percentage varies marginally between the recycle a lot group at 88% than that for the 'recycle everything' group at 91%. In terms of perceived neighbourhood recycling activity from Q19, approximately 46% of respondents who 'recycle a lot' perceive that more than 75% of people in the neighbourhood recycle on a regular basis. However, the percentage response from the 'recycle everything' group is approximately 60%.

Table 6.12 Perceived frequency of recycling by neighbours (from Q16) n= 417

		Q16 How often do your neighbours use the household recycling service?(% of respondents)	
		Every week	Seldom
Q10 Claimed behaviour (% of respondents)	Recycle a lot	88.1% (n= 171)	12.0% (n= 24)
	Recycle everything	91.4% (n= 203)	8.6% (n= 19)
Significance Testing	CI 95% (5% sig)	9.43 -2.83	14.71 -21.51

Table 6.13 Perceived neighbourhood recycling activity (from Q19) n= 443

		Q19 What percentage of people, in your neighbourhood recycle on a regular basis? (% of respondents)	
		76% to 100%	1% - 75%
Q10 Claimed behaviour (% of respondents)	Recycle a lot	46.4% (n=98)	53.5% (n= 113)
	Recycle everything	60.3% (n= 140)	39.6% (n= 92)
Significance Testing	CI 95% (5% sig)	26.67 1.13	11.06 -23.06

Table 6.12 for Q16, illustrates the percentage responses from perceived neighbourhood recycling. Analysing the percentage responses at the 5% significance level suggests that the variation of 3.3% from Table 6.12 is purely by chance and that there is no statistical difference between the proportion of responses between the two sample groups for Q16. However, for Q19 from Table 6.13 this suggests those respondents who perceive more than 75% of people

recycle in the neighbourhood show a clear statistical difference between the sample groups based on recycling behaviour. Conversely the 5% significance results for those respondents who perceive less than 75% recycle in the neighbourhood suggest little variation across both sample groups. In this regard Q19 is suggested to be more useful than Q16 to illustrate the TIB component social norms.

Table 6.14 Role from community decision-making influence (from Q34) n= 281

		Q34 Do you agree or disagree whether you can influence decisions that affect your area? (% of respondents)	
		Agree	Disagree
Q10	Recycle a lot	29.4% (n=66)	26.4% (n= 59)
Claimed behaviour (% of respondents)	Recycle everything	42.7% (n= 107)	19.5% (n= 49)
Significance Testing	CI 95% (5% sig)	27.75 -1.15	8.90 -22.70

Taking the combined responses of 'agree' (quite agree + strongly agree) and 'disagree' (strongly disagree + disagree) from Table 6.15 this suggests that over 42% of the 'recycle everything' group are confident that they can influence decisions at community level. However, this percentage is less than 30% for the 'recycle a lot' group. A stronger level of surety would suggest a stronger role in the community and therefore for the recycle everything group social influence based on role appears to be a contributing factor shaping their recycling intention.

Significance testing for the combined response 'agree' suggests that there is no statistical difference between the sample groups. This is also observed for those respondents for both sample groups that disagree. There was also no difference between the sample groups when tested at the individual response level e.g. 'strongly agree'. In this regard it is suggested that the TIB component 'role' which is represented by perceived influence in community decision making does not appear to influence recycling behaviour

Personal norms and social diffusion

There were no Likert (1932) scale type questions to enable cross-tab analysis for personal norms and for social diffusion (see Chapter 5) as for the other proxy questions. This did not however preclude using the percentage responses from Q23 and calculating the confidence intervals.

Table 6.15 Q23 Personal norm and role based on motivation to recycle

		Q23 What if anything motivates you to recycle? (% of respondents)	
		Feel guilty if I don't/better if I do	Because my friends and neighbours do
Q10	Recycle a lot	45 (n= 94)	24 (n=6)
Claimed behaviour (% of respondents)	Recycle everything	55 (n= 115)	76 (n=19)
Significance Testing	CI 95% (5% sig)	23.56 -3.56	91.20 12.80

From Table 6.15, it is observed that there is no difference between the sample groups for personal norm in which this is represented by people feeling guilty about not recycling and better if they do recycle. The influence in motivating people to recycle from family and friends however does show a statistical difference between the two sample groups. This suggests that the level of influence on the role of the individual arising out of social diffusion is different based on recycling preference.

Summary of intention components

From the analysis of the data for the TIB components forming 'behavioural intention' there were a number of proxy questions that showed differences between the recycling behaviour preference sample groups. The TIB components 'perceived consequences', 'evaluation of consequences', 'social norms', role (based on social diffusion) and 'affect' all suggested a variance based on type of recycling behaviour. Regarding the TIB component 'affect' concern over disposal of waste that is not recycled appeared to be the dominant influencing factor on recycling behaviour with statistical differences identified between the sample groups for this parameter. In this

regard those respondents who are very concerned about disposal of household waste are likely to recycle more than those respondents who are not as concerned. However, this is not the case for 'affect' when used in a concern over global climate change and to some extent 'local pollution' perspective.

Habit

Table 6.16 illustrates habit from a general recycling frequency based on proxy question 15 for the sample groups. The percentage responses based on a claimed weekly recycling frequency was marginally less for the 'recycle a lot' sample group at 89.8% than that for the 'recycle everything' group at 94%. Significance testing confirmed that there was no difference between the sample groups.

Table 6.16 Frequency of general recycling (from Q15) n= 411

		Q15 How often do you use the household recycling service?(% of respondents)	
		Every week	Seldom
Q10 Claimed behaviour (% of respondents)	Recycle a lot	89.8% (n= 193)	10.2% (n= 22)
	Recycle everything	94.4% (n= 219)	5.6% (n= 13)
Significance Testing	CI 95% (5% sig)	9.84 -0.64	13.18 -22.38

Habit was examined also on a material specific basis using Q22. Question 22.1 to 22.8 provides the claimed frequency of recycling based on a particular material. Q22.1 to Q22.5 includes recyclable materials which are collected at the kerbside. These materials are referred to as 'mainstream' recyclables and include paper, card, glass, food and drinks cans and plastic bottles. Q22.6 and Q22.8 however include textiles and garden waste, which are not collected (at the time of the survey) through the kerbside service. Due to the extremely low percentages for the frequency of recycling of materials from Q22.1 to Q22.5 and low numbers of respondents for 'never' and 'sometimes' only the frequencies for 'every time' and 'most times' were analysed. Tables 6.17 and 6.18 show the percentage of responses for Q22.1 to Q22.5 for recycling 'every time' and recycle 'most times' for each sample group.

Table 6.17 Claimed recycling frequency from Q22.1 to Q22.5 (n in parentheses)

		Q22 How frequently do you recycle the following materials?(% of respondents)				
		Every time				
		Paper	Card	Glass	Cans	Plastic
Q10 Claimed behaviour (% of respondents)	Recycle a lot	78.6% (176)	77.7% (174)	74.1% (166)	58.2% (126)	75.4% (169)
	Recycle everything	95.6% (240)	93.2% (234)	91.2% (229)	87.6% (22)	90% (226)
Significance Testing	CI 95% (5% sig)	23.59 10.41	22.48 8.52	24.71 9.49	39.05 19.75	22.18 7.02

Table 6.18 Claimed recycling frequency from Q22.1 to Q22.5 (n in parentheses)

		Q22 How frequently do you recycle the following materials?(% of respondents)				
		Most times				
		Paper	Card	Glass	Cans	Plastic
Q10 Claimed behaviour (% of respondents)	Recycle a lot	15.2% (34)	15.2% (34)	21.9% (49)	24.8% (55)	17.0% (38)
	Recycle everything	3.26% (8)	4.0% (10)	6.0% (15)	8.4% (21)	6.0% (15)
Significance Testing	CI 95% (5% sig)	5.16 -29.16	5.92 -28.32	0.79 -32.59	0.06 -32.86	5.94 -27.94

The percentages for those respondents who claim to recycle most times showed no difference for the sample groups on significance testing. However, the percentages for those respondents who claim to recycle 'every time' showed a difference between the sample groups across all kerbside collected materials. Therefore, even though the practice of recycling involves little effort for kerbside recycling, there is a difference between the two sample groups for those who recycle on a regular (every time) basis. For those materials not collected at kerbside (textiles and garden waste) the distribution of responses between the two groups however differs significantly than that from the mainstream materials percentages. These are illustrated in Tables 6.19 and 6.20.

The percentage of responses for recycling of textiles and garden waste from Q22.6 and Q22.8 respectively were combined as textiles are something that would not normally be disposed of on a weekly basis.

Table 6.19 Frequency of recycling of textiles (from Q22.6) n= 411

	Q22.6 How often do you recycle textiles?(% of respondents)		
		Every week/most times	Sometimes/never
Q10 Claimed behaviour (% of respondents)	Recycle a lot	40.6% (n= 91)	50.0% (n= 112)
	Recycle everything	53.4% (n= 134)	29.5% (n= 74)
Significance Testing	CI 95% (5% sig)	25.96 -0.36	-6.58 -34.42

This also applies to garden waste with the added factor of it being seasonal. The difference between the two sample groups based on the combined 'every week and most times' recycling frequency for textiles was not found to be statistically significant at the 5% significance level, however, for those individuals who sometimes or never recycled textiles a statistical difference was observed. For garden waste recycling there was a statistical difference between the 'recycle everything' and the 'recycle a lot' groups for both recycling every week/most times and for sometimes/never. This may be associated with not having a garden, however this question was not asked in the 2006 survey.

Table 6.20 Frequency of recycling garden waste (from Q22.8) n= 475

	Q22.8 How often do you recycle garden waste ?(% of respondents)		
		Every week/most times	Sometimes/never
Q10 Claimed behaviour (% of respondents)	Recycle a lot	33.0% (n= 74)	54.5% (n= 122)
	Recycle everything	53.3% (n= 134)	32.3% (n= 81)
Significance Testing	CI 95% (5% sig)	33.94 6.66	-8.72 -35.68

In summary for habit based on frequency of recycling there were statistically significant differences between the two sample groups for 'every time' recycling of all kerbside collected materials and garden waste only. There were also significant differences between the groups based on non-recycling and sometimes recycling claimed frequencies of these materials. However, no differences were identified for

lower frequencies of recycling from the mainstream materials (Q22.1 to Q22.5). For textiles, only recycling of material on an infrequent basis showed differences between sample groups with garden waste recycling showing differences at both regular and low level frequency of recycling. It is suggested that recycling of textiles and garden waste require greater effort for participation and may not be for respondents as habitual an activity as that for recycling of kerbside collected materials. The differences in respondents for garden waste however may be due to residents not having a garden or access to a vehicle to take garden waste to the HRC.

Facilitating Conditions

The final component in the TIB framework is facilitating conditions, which includes convenience of recycling (Q6) and awareness of recycling (Q7).

Recycling Convenience as a facilitating condition component?

Convenience of recycling was identified in Chapter 5 as a major contributing factor in influencing behaviour, which is in accordance with previous research on barriers to recycling (WRAP, 2008). Table 6.21 illustrates recycling convenience for the sample group, where it was observed that 55% of the group who 'recycle everything' consider recycling "very convenient". However, on aggregate the percentage increases to 92% who consider recycling is convenient. This percentage however varies marginally for the other group in aggregate (88%). Testing at the 5% significance level did not identify any statistical difference between the sample groups for a combined convenient (very convenient + fairly convenient) percentage and for a combined not convenient (not very convenient + not at all convenient) percentage. However, when the responses for very convenient and fairly convenient were considered separately, there was an observed statistical difference between the sample groups. Convenience of recycling is considered a key facilitating condition in accordance with the TIB for differentiation between recycling preference.

Table 6.21 Recycling convenience (from Q6) n=472

	Q6 How convenient is it for you to personally recycle your household waste ?(% of respondents)			
		Very Convenient	Fairly Convenient	Not convenient
Q10 Claimed behaviour (% of respondents)	Recycle a lot	22.0% (n= 49)	65.9% (n= 147)	12.1% (n= 27)
	Recycle everything	54.6% (n= 136)	37.3% (n= 93)	8.0% (n= 20)
Significance Testing	CI 95% (5% sig)	46.90 18.30	-16.14 -41.06	13.01 -21.21

Recycling awareness

For the second facilitating condition 'recycling awareness' the percentage of responses from Q7 were combined into two categories which were 'know a lot' (score 4 + 5) and know a little (score 1 + 2). As for Q8 the responses for awareness were rated on a score between 1 and 5. In the case of awareness a score of 1 is know nothing and a score of 5 is know a lot. A score of 3 was regarded as being a middle value representing neither know a little or a lot and was excluded from the analysis. Table 6.22 shows the percentage of responses for the two combined sample groups.

Table 6.22 Recycling awareness (from Q7) n=355

	Q7 How would you rate your knowledge of how to recycle?(% of respondents)		
		Know a lot	Know a little
Q10 Claimed behaviour (% of respondents)	Recycle a lot	58.5% (n= 131)	4.9% (n= 11)
	Recycle everything	81.6% (n= 204)	3.6% (n= 9)
Significance Testing	CI 95% (5% sig)	33.07 13.13	16.33 -18.93

For the know a lot category there was a significant statistical difference between the two sample groups but not for the 'know a little' category. A check on the 5 and 4 scores was also undertaken for which a statistical difference was observed for a score of 5 (know a lot) at 35.32 and 3.08 at the 5% level. However, no statistical difference was observed between the two sample groups for a score of 4. In this

regard it is suggested that those respondents who expressed a high level of knowledge for recycling tended to recycle 'everything they can' and the TIB factor awareness is considered a key factor in determining recycling behaviour. Although the question is not scaled (as for Q23), Q12 and Q13 includes the percentage of responses based on awareness of facilities and usage of local facilities for recycling respectively. Table 6.23 summarises these responses.

Table 6.23 Awareness (from Q12) and usage of recycling facilities (from Q13)

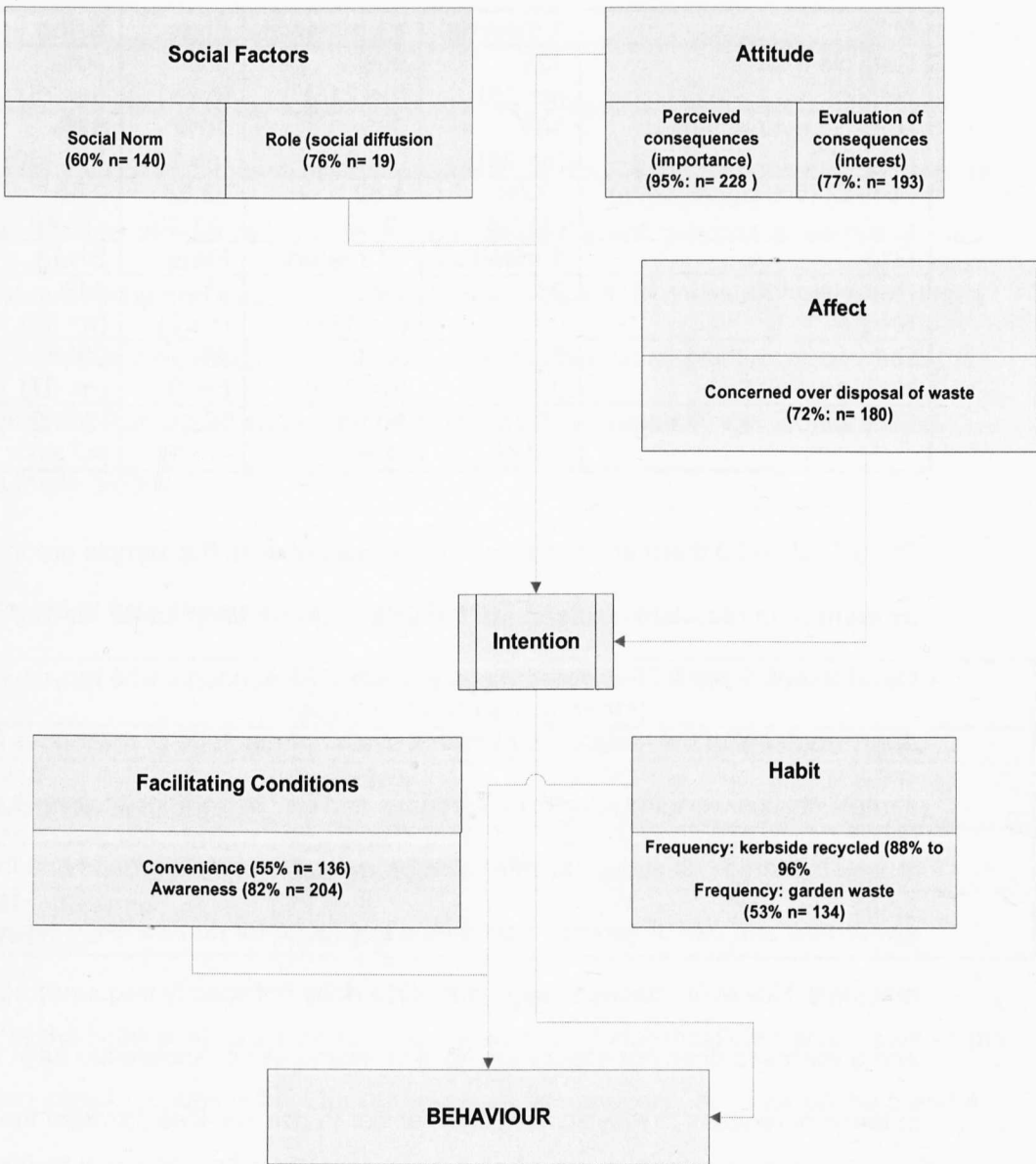
Q12	1 material	>1 material	Flats	Bring	HRC
Recycle a lot N= 224	12% (n= 16)	95% (n= 215)	4% (n= 9)	70% (n= 157)	79% (n= 177)
Recycle everything N= 251	10% (n= 26)	96% (n= 242)	10% (n= 25)	62% (n= 156)	65% (n= 163)
95% CI (5% significance)	17.66 -21.66	4.82 -2.82	23.38 -11.38	2.46 -18.46	-4.53 -23.47
Q13	1 material	>1 material	Flats	Bring	HRC
Recycle a lot N= 224	9% (n= 20)	79% (n= 177)	1% (n= 2)	41% (n= 92)	63% (n= 140)
Recycle everything N=251	7% (n= 17)	82% (n= 207)	3% (n= 8)	39% (n= 97)	54% (n= 135)
95% CI (5% significance)	15.45 -19.45	10.96 -4.96	20.16 -16.16	-26.22 -47.48	2.60 -20.60

From Table 6.23 there are statistical differences between the sample groups for awareness of recyclable materials at HRCs and use of bring banks for recycling. Column 3 of Table 6.23 shows the percentage of respondents who recycle more than 1 material at the kerbside for which a similar percentage of responses from both sample groups were obtained for awareness and for usage. Significance testing suggests there is no statistical difference between the sample groups and that awareness and use of services becomes a key factor for non-kerbside recycled materials. However, claimed usage from Q13 does not specify frequency as for Q22 and awareness does not specify the level of awareness or knowledge as in Q7. Also in terms of reasons to recycle from Q24, easier to use services provided the greatest encouragement amongst respondents who say they "recycle, but only if it requires no extra effort" with 62% stating this would encourage them to recycle more, which implies no sorting of recyclables would encourage greater participation.

6.4 Summary of analysis of claimed behaviour survey

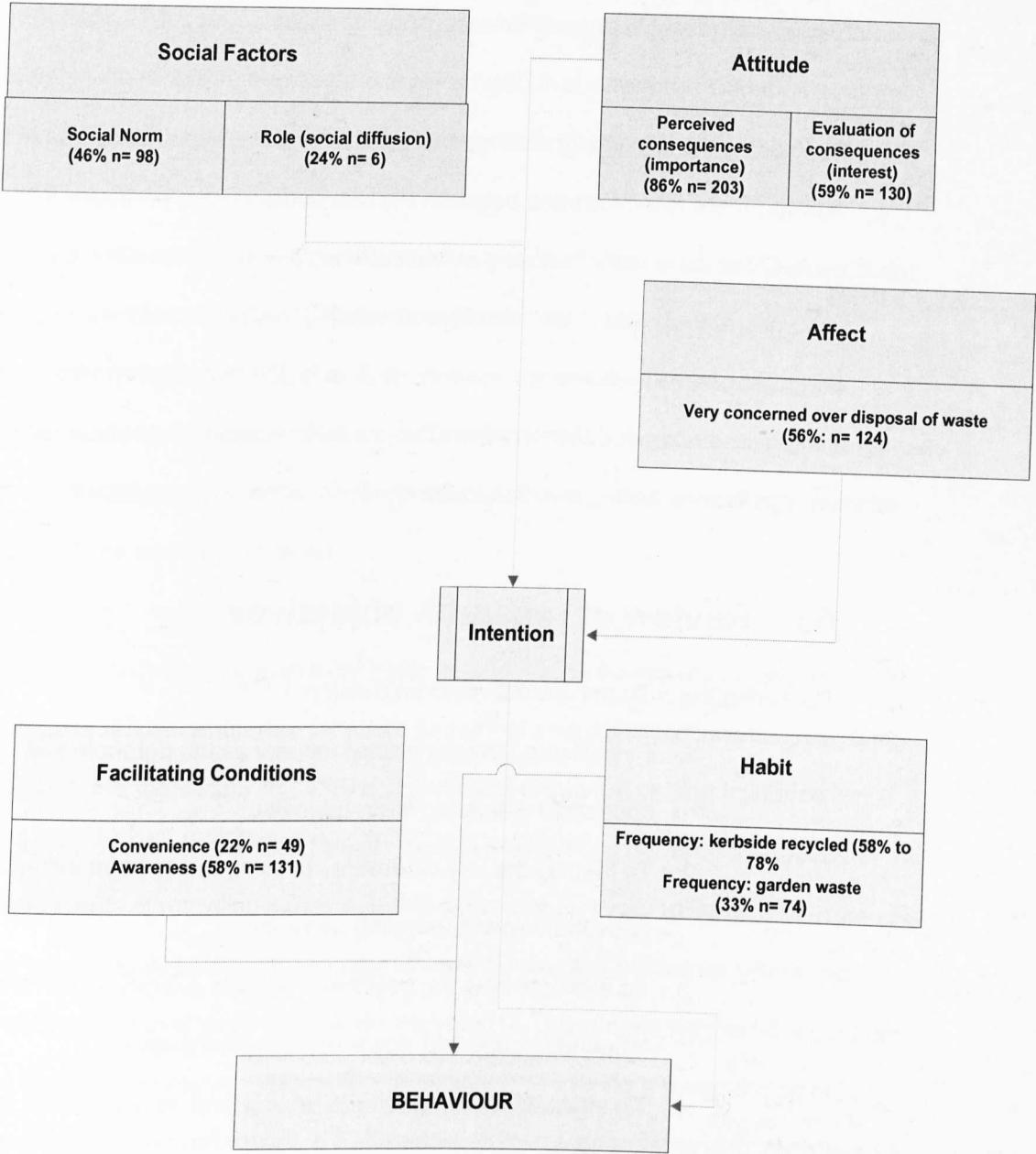
Figures 6.2 and 6.3 show the percentage of respondents for each sample group for those questions which identified a statistical difference between the sample groups.

Figure 6.2: Recycle everything group- TIB model.



Note: Percentages in above figures based on positive responses to proxy questions

Figure 6.3: Recycle a lot group – TIB model



Note: Percentages in above figures are based on positive responses to proxy questions

It is fairly clear that there are some statistical differences in the proportion of responses between those respondents who fall into the 'recycle everything' and 'recycle a lot' sample groups. These differences were identified for most of the proxy questions and consequently TIB components to enable a visual comparison using the TIB model to be made between the sample groups based on recycling

preference. The use of significance testing provided a means to differentiate between the sample groups for each proxy question.

Concluding the use of significance testing also enabled hypotheses based on whether there is a difference between the respondents for a particular TIB component to be tested with the null hypothesis (H_0) being the default position “there is no difference”. The Alternative Hypothesis (H_A) states there is a real difference in that the observed difference between the data is due to the group effect in the sample and not just due to chance. The data which showed an observed difference on significance testing resulted in the rejection of the null hypothesis.

6.5 Review of research objectives

Revisiting the research objectives from Section 3.1.2 :

1. To evaluate how preference influences the determinants of household waste recycling behaviour.
2. To identify the key determinants using the TIB that influence household waste recycling behaviour.
3. To evaluate how the social and attitude components in the TIB influence household waste recycling behaviour.
4. To evaluate how intention to recycle and habit influence household waste recycling behaviour.
5. To evaluate how facilitating conditions influence household waste recycling behaviour and behavioural intention.
6. To identify the key determinants using the TIB that may inhibit household waste recycling behaviour.

Commencing with the first objective analysis of the data for each proxy question showed some statistically significant differences between the sample groups. These differences were identified using significance testing. Very few statistical differences

were identified based on the proportion of negative type responses e.g. recycling not important. This suggests that negative determinants of recycling behaviour tend not to vary with recycling behaviour compared with that where the influence from the determinant is positive e.g. recycling is very/fairly important.

Figures 6.2 and 6.3 show the percentage of respondents for each TIB component that resulted in a statistical difference between the sample groups 'recycle everything' and 'recycle a lot' and which were based on a positive response. However a representation of behavioural determinants based on negative responses for each sample group could not be produced as there were very few differences between the two sample groups.

Furthermore there is no statistical basis, based on the survey responses, to justify that those respondents who 'recycle a lot but not everything' or 'recycle everything they can' are more likely to express a particular opinion regarding influence on recycling. In this regard even though there is a difference between the groups in the determinants of recycling behaviour, this difference is non-directional. This difference is also only applicable to those determinants of recycling behaviour where the Confidence Interval does not include the value 0. This means we are 95% confident that the true population value for the difference in favouring a particular opinion regarding influence on recycling behaviour between respondents who 'recycle a lot' and 'recycle everything' is not zero and the null hypothesis is rejected.

With regard to the second objective, this involves taking into account influence on recycling behaviour in the presence of other factors. Significance testing provides an indication of the difference between two sets of data from the two sample groups, however it cannot collectively illustrate the main influencing determinants of recycling behaviour taking into account the influence from other determinants. In this regard

multiple regression may be used to determine the influence on a response variable from more than one predictor variable, which is discussed in the following section.

6.5.1 Regression analysis of multiple variables

Regression analysis seeks to predict an outcome variable from a single predictor variable and multiple regression seeks to predict an outcome from several predictors. Linear regression involves fitting a linear model based on a straight line, however other forms of regression are available to fit a model which best describes the data. The data may be continuous, ordinal or nominal where linear regression is normally used for the former (continuous) and non-linear regression used for ordinal and other types of categorical data. An explanation of the principles of regression and its application are provided in Field (2005, pp 157-174) in which the general model for regression is based on the equation:

$$Y_i = (b_0 + b_1X_1 + b_2X_2 + \dots + b_nX_n) + \epsilon_i - \text{where:}$$

Y_i = the outcome to be predicted

X_1, X_2, X_i = the 1st second and i th value for each predictor variable

b_1, b_2, b_n is the gradient of the straight line fitted to the data (coefficients of 1st and 2nd and n th predictors)

b_0 is the intercept of the gradient of the line

ϵ_i is the difference between the predicted and observed value for Y for the i th participant (referred to as the residual)

Regression on ordinal data may be undertaken using non-linear transformation of the ordinal data using categorical regression (CATREG). This technique simultaneously scales ordinal (as well as nominal and numerical) variables to enable these transformed variables to be treated in the same way as continuous variables allowing them to be analysed at a variety of levels to find the best fitting model. The

use of regression analysis was undertaken on the combined sample with Q10 (“which of the following statements describe how much you recycle”?) as the dependent (response) variable and, the other TIB components from the proxy questions as independent (predictor) variables. In accordance with regression analysis the parameter R^2 represents how much of the variance in the response is explained by the weighted combination of predictors in the regression model.

Regression analysis of the data on the combined sample groups (recycle everything/recycle a lot), using linear regression only, accounted for 37% of the variance in the model. However when the same data was subjected to analysis using CATREG, this provided a model in which 62% of the variance in the transformed claimed behaviour rankings was explained by the regression on the optimally transformed predictors. The categorical regression model is illustrated in Table 6.24.

Table 6.24: Categorical regression model summary

Multiple R	R square	Adjusted R ²	Apparent Prediction Error
0.785	0.617	0.576	0.383

Comparing the above results transformation of the predictors using CATREG improves the fit over the linear regression approach. The next stage involved analysis of regression coefficients to identify the major influencing predictor variables in the model. These coefficients are listed in Table 6.25. The analysis of these results suggest that the major influencing determinants of household recycling behaviour in accordance with Q10 from the 2006 survey are associated with convenience of recycling (Q6) and recycling of glass (Q22.3) and of plastic bottles (Q22.5) with 62% of the variance explained by the model.

In this regard to answer question 3 the key determinants of household recycling behaviour are:

1. Convenience of recycling
2. Recycling of glass and;
3. Recycling of plastic bottles

A full description of the process undertaken and analysis of the data is provided in Appendix 3.

Table 6.25: Standardised coefficients for transformed predictors

Proxy Question	Beta	F	Sig	Zero Order	Partial	Part	Imp	Tolerance*
Q1.3	0.067	0.152	0.697	0.239	-.094	0.058	0.026	0.618
Q1.4	-0.093	1.396	0.244	-0.007	-0.137	-0.085	0.001	0.814
Q4	0.075	0.086	0.918	0.396	0.101	0.063	0.048	0.669
Q6	0.288	1.305	0.273	0.547	0.371	0.247	0.255	0.854
Q7	0.088	1.828	0.162	0.222	0.131	0.082	0.032	0.793
Q8	0.049	0.502	0.606	0.257	0.068	0.042	0.020	0.670
Q16	-0.078	2.036	0.154	0.027	-0.118	-0.074	-0.003	0.790
Q19	0.093	3.579	0.014	0.248	0.138	0.086	0.037	0.762
Q22.1	0.099	0.225	0.879	0.592	0.095	0.059	0.095	0.336
Q22.2	-0.083	0.568	0.567	0.344	-0.110	-0.068	-0.046	0.428
Q22.3	0.273	1.653	0.177	0.623	0.258	0.165	0.275	0.436
Q22.4	0.057	0.195	0.823	0.357	0.079	0.049	0.033	0.694
Q22.5	0.169	1.443	0.219	0.552	0.185	0.116	0.151	0.464
Q22.6	0.074	2.315	0.129	0.213	0.108	0.067	0.025	0.730
Q22.8	0.016	0.101	0.959	0.143	0.024	0.015	0.004	0.757
Q34	0.017	3.264	0.022	0.268	0.162	0.102	0.047	0.889

* Transformed variable

Regression analysis could not be used to identify the main determinants of recycling behaviour for each sample group due to there being only 1 response to the behaviour question (response variable). In this regard the previous findings based on significance testing were used to confirm that there is a difference between the sample groups based on recycling behaviour but it could not be determined whether the main influencing determinants of recycling behaviour modelled on the combined sample differ between the two sample groups.

For the other objectives 3 to 6 the TIB components which showed a statistically significant difference between the sample groups were cognitive attitude,

(importance and interest), affect (based on concern over disposal of waste), social factors (social norms, role), habit (kerbside materials and garden waste based on recycling frequency) and facilitating conditions (recycling convenience and awareness). Role was associated with social diffusion based on influence from family and friends but not from influence in community decision-making. The results are non-directional meaning it was not possible to identify from the data whether greater or less emphasis is placed on social norms over attitudes and habit over intention in accordance with objectives 3 and 4. With regard to objective 5 influences from the facilitating conditions 'convenience of recycling' and 'awareness' were identified as different between the groups, however the role played by facilitating conditions could not be identified based on quantitative data alone. For the last objective, in terms of inhibiting factors, it is suggested that this is the opposite of the main influencing determinants i.e. inconvenience and non-provision of recycling for plastic bottles and glass.

6.6 Conclusion

The use of the Q10 sample groups was partially successful in demonstrating the TIB as an effective framework for illustrating the arrangement of determinants of recycling behaviour. It was also useful in showing differences between the sample groups and identifying if the differences in percentages between the two sample groups were significant or not using confidence intervals. The use of confidence interval tests do not identify the impact from other determinants and are therefore associated with one variable. However the use of confidence intervals do provide a means to illustrate a difference in patterns between the sample groups. This suggests that there is a difference based on recycling behaviour for the TIB components in accordance with behavioural preference.

To identify the influence on a dependent variable, in this case behaviour, from a number of independent variables (recycling determinants), statistical tests typically

include regression and similar advanced techniques. However the data is ordinal requiring a non-linear transformation of the ordinal data using categorical regression (CATREG). The results provide an indication of which are the key influencing variables on recycling behaviour as a whole (combined responses to Q10) and not on behavioural preference based on each sample group for Q10 (recycle a lot/recycle everything).

The difference in behavioural patterns based on recycling preference would need to be examined using other means of analysis. In this regard a third phase involving comparison of behavioural influences from a set of household interviews was undertaken. This provides a means of verifying whether each component in the TIB gives similar findings, i.e. there is a difference in behavioural influence between individuals who express a particular recycling preference. This is covered in the next Chapter.

CHAPTER SEVEN: Phase III - Qualitative analysis of household recycling behaviour

7.1 Introduction to Chapter

The previous Chapter included quantitative analysis of the 2006 RBWM claimed behaviour survey data from Phase II, focussing on descriptive statistical relationships and testing of hypotheses consistently throughout each respective TIB component using the Triandis' Theory of Interpersonal Behaviour (TIB). Phase II involved the selection of two sample groups of respondents based on the proxy question representing claimed behaviour and with each group characterised by their level of claimed behaviour as those who 'recycle everything they can' or 'recycle a lot but not everything' (referred to as behavioural preference). Each sample group was then tested using 95% confidence intervals to identify whether there were statistical differences between the sample groups for each TIB component. The information was then used to identify whether behavioural preference results in differences in determinants of household recycling behaviour. Those determinants which showed a difference were mapped onto the TIB model to illustrate how the pattern of household recycling behaviour determinants varies with behavioural preference.

This third phase of the research set out in this chapter, involved conducting a number of semi-structured interviews with residents from the Royal Borough of Windsor and Maidenhead (RBWM) on household recycling behaviour. These interviews which were held 3 years after the 2006 claimed behaviour survey and involved a selection of panellists from the 2006 survey. The responses from the interviews were mapped onto the TIB model to create behavioural profiles and enable variations and similarities between these to be examined for each interviewee.

7.2 Purpose of qualitative analysis and stages of the research for phase III

Quantitative analysis of the 2006 survey was undertaken in the previous chapter using proxies from the questionnaire to represent the TIB components. Although the survey questions were not specifically designed on the TIB, almost all of the TIB components were represented by the proxies with the exception of the self-identity component. Qualitative analysis was used to analyse the transcripts from each interview to provide a more in-depth understanding of behaviour and for comparison with the findings from the quantitative analysis of the survey data in the previous chapter. The research for this thesis however uses a mixed-method approach based on quantitative and qualitative analysis of data.

7.3 Selection of interviewees and data protection issues

The households interviewed were selected from the panellists from the 2006 claimed behaviour survey. The interviewees were selected by writing to a random sample of 50 panellists from the 2006 survey to invite them to participate in a household interview. Out of the 50 panellists approached, 20 responded favourably to the invitation, however only 8 out of the 20 households were actually interviewed. This was due to cancellation of appointments and general unavailability of the householder for interview. The interviews were semi-structured with each question based on a TIB component. Furthermore, all of the interviews, with the permission of the interviewee, were recorded where audibly possible (one location was in the flight path from a major airport). It was also confirmed by the interviewee that they were the same person who completed the claimed behaviour questionnaire in 2006. Prior to interview a declaration form was signed by each interviewee stating they understood and agreed to the conditions of the interview. The declaration form also

included contact details of the researcher and the researcher's thesis supervisor.

The declaration form was used in addition to written permission from the Council, to comply with the Data Protection Act (DPA) 1998 requirements in particular Schedule 2 which ensures the rights and freedoms of the interviewees are not infringed.

Compliance with the DPA ensures that the reporting of the results were anonymous in that it will not be possible to identify who the person is from the thesis or any other personal details. The conditions of the research also adhere to the British Psychological Code of Ethics and the Open University Policy for ethical requirements of conducting research on human subjects.

7.4 Qualitative analysis of information from household interviews

After conducting the interviews a series of statements were developed from the interview transcripts to provide a descriptive response for each TIB component. These descriptive responses were illustrated in the form of a 'pen portrait' for each interviewee. The household interviews were undertaken to provide richer in-depth information on household recycling with focus on the '*why*' element of recycling behaviour i.e. why a belief is held or why materials are recycled. This complements the focus placed on the '*what*' element of household recycling behaviour from the quantitative analysis of the 2006 survey data in the previous chapter. However, as there are aspects of both 'what' and 'why' elements in both qualitative and quantitative data, this enabled the researcher to explore in greater depth each of the TIB components.

7.4.1 Pre-Interview process

Prior to conducting the interviews, a series of questions from the 2006 survey were completed by each interviewee. This pre-interview stage was used for comparison of

the responses from the 2006 survey to identify any significant changes in claimed behaviour over the 3-year period. The pre-interview questionnaire is attached in Appendix 4, and is based on a selection of questions from the 2006 claimed behaviour survey. For completeness, all of the proxy questions representing the TIB components and analysed in chapter 6, were included in the pre-interview questionnaire.

Results from pre-interview survey

Each interviewee's response to the pre-interview questionnaire was compared with the response to the same questions from the 2006 survey. This was to identify if there were any significant variations over the three year period and whether these may be attributable to changes in service provision (i.e. facilitating conditions changes). Each interviewee was also asked why they selected the response to the question on claimed behaviour (Q10 from 2006 survey – Q7 on pre-interview questionnaire) without notifying them of their previous response. This was undertaken to obtain an objective response without introducing any bias from their response to the same question in 2006.

The results from the pre-interview suggested that little had changed over the three-year period. Where there were changes in the responses these included increased concern over disposal of waste that is not recycled, interest in recycling and frequency of recycling and recycling garden waste. There was also an increase in claimed behaviour for three interviewees (score 3 to 4) and two interviewees (score 2 to 3). A decrease in concern over global climate change and local pollution were observed plus decrease in frequency of recycling food and drinks cans and recycling of garden waste.

These results suggest a heightened concern over an increase in the landfilling of waste and an increase in behavioural preference for household recycling. The

change in responses may be attributed to the introduction of a kerbside collected garden waste service by the Council in 2008, and the introduction of a recycling incentive scheme providing rewards for recycling. In addition, improvements to bring banks with regard to appearance and safety may have influenced an increase in claimed recycling frequency of textiles. The promotion and awareness of recycling initiatives by the Council may also contribute to a heightened awareness and increase in interest in recycling. However the pre-interview is based on a response from eight of the 2006 panellists out of a total 506. In this regard the findings from the pre-interview are at best indicative of the interviewee's state of mind at the time of the interview.

7.5 Household Interviews

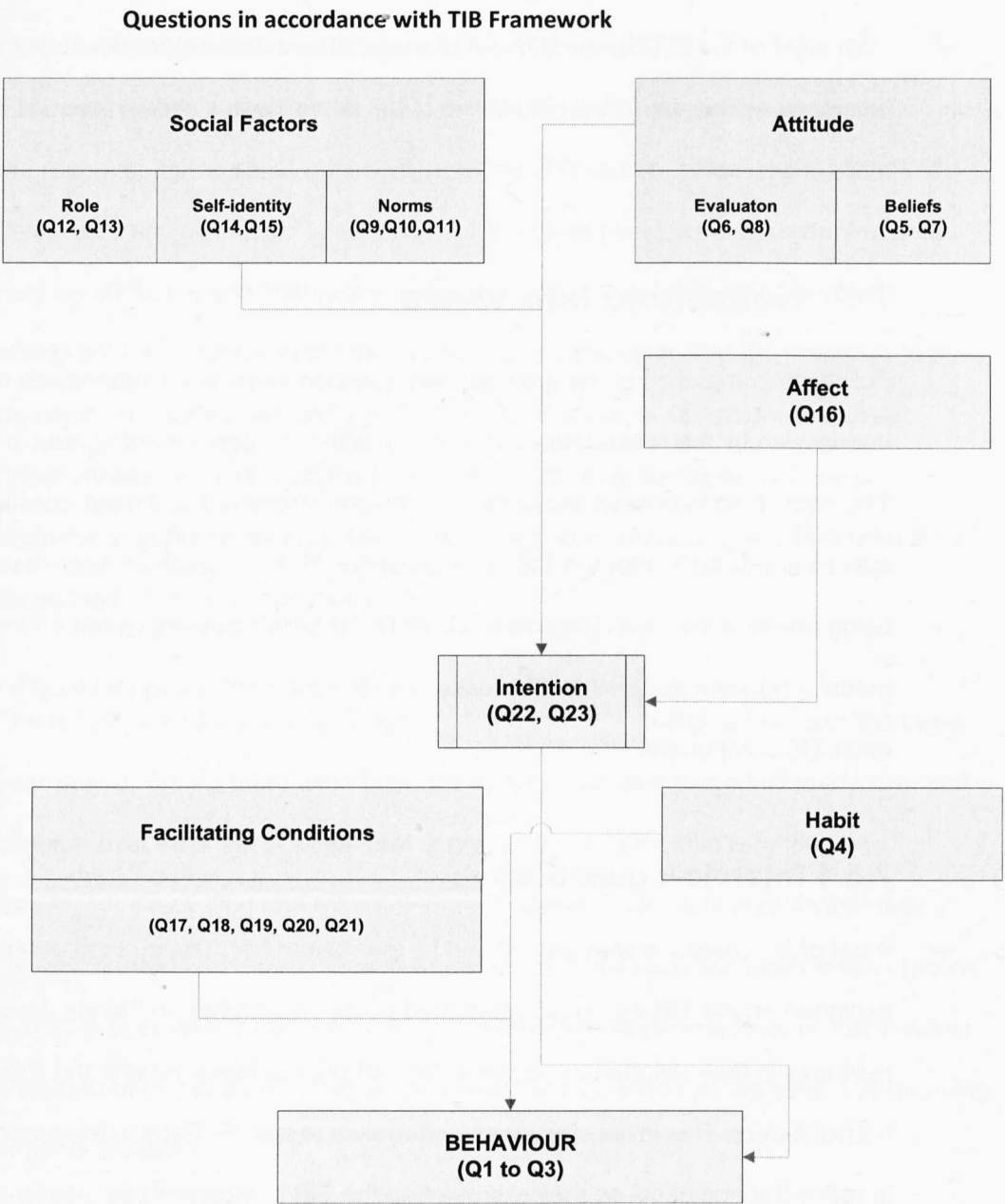
Following completion of the pre-interview questionnaires each interviewee was interviewed by the researcher at their home with the appointment agreed in advance. The household interviews conducted were semi-structured and used questions specifically designed for the TIB. The questions for the interviews were developed using previous surveys (Gagnon et al, 2003, 2006) which were based on the TIB model, and were adapted by the researcher to represent household recycling for each TIB component.

7.5.1 Interview questions

A set of 24 questions were developed by the researcher. The questions which were designed on the TIB were also pre-tested by the researcher on friends, family and residents in their neighbourhood (not RBWM) prior to interview with the RBWM householders. This initial stage was undertaken to identify gaps in the process and to refine the questions so they represented the TIB components as closely as possible

The interview questions are shown on the above model with the respective interview question representing each TIB component shown in Figure 7.1. The questions from the interview are listed below in accordance with the respective TIB component.

Figure 7.1 TIB framework and household interview questions



Also some of the questions were modified for clarity and to address potential sensitivity of the interviewees.

An example is given from the question to measure the TIB component ‘affect’ where feelings and emotions are explored. Interviews were arranged with the householder with all interviews completed within a 4-week period and conducted at their home. This also allowed the researcher to notify a contact person of their specific location for personal safety requirements. All interviewees were requested in advance of the interview for the interview to be recorded in order for detailed qualitative analysis of the interview transcripts. This was possible for all but one of the locations, which was located in the flight path of a major UK airport, which prevented recording.

A brief introduction was given to each interviewee explaining that the purpose of the interview was a follow-up to the questionnaire they completed in 2006 on waste and recycling to cover off any gaps in the information provided and to expand on particular points to obtain an overall picture of the drivers associated with recycling behaviour. They were informed that the interview should take no longer than 1 hour to complete. The interview questions are listed in Table 7.1 accordance with their TIB component and then briefly described as to their relation to the TIB component. During the interview process a number of the interviewee’ responses were followed up with probing questions to elicit the reasons behind the response. Prompts and probing questions were also included for certain questions to ensure exploration of the TIB components.

Table 7.1 Household Interview questions

TIB component	Question
Behaviour	1. Who does the recycling in the household? Do other people contribute or is it mainly yourself? 2. What materials do you recycle through a) the kerbside service and b) through other means 3. Your response to Q7 on recycling behaviour from the pre-questionnaire was ... Why did you select this option?
Habit	4. How often do you recycle via

	<p>a) the kerbside service</p> <p>b) other means?</p>
Cognitive Attitude (Pc and Ec)	<p>5. What are the advantages or benefits as a consequence of you recycling?</p> <p>6. Are these benefits of general or particular importance to you?</p> <p>7. Are there any downsides to recycling for you?</p> <p>8. Are these downsides of any consequence to you?</p>
Social factors	
Personal norm	9. Is recycling in your household a <u>personal value</u> ? If so, can you describe why this is?
Social norms	10. Who influences recycling in your household?
Role	11. Are there any people who discourage you from recycling?
	12. Looking at the people who recycle their waste in your neighbourhood what particular <u>characteristics</u> do they have? Do you personally identify yourself with these characteristics?
	13. Looking at the people who do not or seldom recycle their waste in your neighbourhood what particular <u>characteristics</u> do they display? Do you agree with these characteristics?
Self-identity	14. Do you consider recycling of household waste a good example of caring for the <p>a) community</p> <p>b) environment</p>
	15. Do you consider yourself as someone who is concerned with <p>a) your neighbourhood</p> <p>b) the Environment</p>
	And do you personally believe that someone who recycles can improve quality of life in the neighbourhood?
Affect	16. What <u>feelings</u> and <u>emotions</u> if any, do you experience when recycling? Do these feelings extend to other environmental activities?
Facilitating Conditions	17. What would <u>discourage</u> you to recycle?
	18. What would <u>encourage</u> you to recycle more?
Materials	19. Are there other materials/items you would like to recycle but do not feel able to?
Awareness	20. How aware of services for recycling and programmes available and do you feel you know all you need to know about a) the kerbside service and b) other recycling opportunities?
Information	21. Is it easy to find information on a) the recycling service and b) recycling in general
Intention	22. Are you more motivated to do more recycling following this interview?
	23. Finally, considering the above issues we have discussed has this affected your current intention to recycle/recycle more?
	24. Is there anything we haven't covered that you wish to add?

Discussion of interview questions in relation to TIB

Claimed behaviour

The first set of questions 1 to 3 were designed to address claimed behaviour in terms of whether there was a particular person that recycles in the household and whether that person was the interviewee. Follow up questions included what materials are recycled through the kerbside collection service and by other means such as bring banks, HRC charity shops. This provided a means of identifying the pattern of recycling (but not the drivers) with a final question asking why they selected a particular option on the pre-interview questionnaire (this was later compared with their 2006 response).

Habit

Habit was next examined in question 4 in terms of the frequency of recycling as undertaken via the 2006 survey. This included use of the kerbside collection service or through other means. Probing questions were asked to determine how frequent, where they recycled and how much of this material was recycled.

Cognitive attitude

Questions 5 and 6 represent the TIB components perceived consequences (Pc) and evaluation of consequences (Ec) and were asked from a positive perspective of the interviewee, based on benefits to the individual, whereas questions 7 and 8 were directed toward soliciting a negative response based on downsides of recycling perceived by the individual.

Social factors

A series of questions covering the social factor components of TIB were provided in questions 9 to 15 commencing with personal norms. Questions 10 and 11 cover social norms in which the interviewee was prompted with further questions as to whether influence was from family and friends, neighbours, the community etc. They were also asked what would discourage them from recycling and if their neighbours did not recycle would this affect them. Questions 12 and 13 include the role component in which the interviewee was asked to explain the characteristics of someone who recycles/does not recycle in their neighbourhood and whether they identified themselves in that role. Question 10 to 13 represented both positive (benefits) and negative (downsides) aspects of social norms and their role in the neighbourhood. Self-identity was questioned firstly as the activity of recycling and whether they thought this was a good thing and secondly, from a self perspective in terms of whether they personally identified themselves with that activity.

Affect

Question 16 included the affect component and explored the individual's feelings and emotions regarding household recycling. The interviewee was prompted with examples if they became stuck to assist in the process such as do you feel good, bad or indifferent? They were also asked if similar feelings extended to other environmental activities and what were these, to identify any spill-over effects.

Facilitating conditions

Questions 17 to 21 covered facilitating conditions firstly from a general barrier and enabler perspective and secondly on to specific conditions such as items that they would like to recycle but cannot, awareness of services and whether they feel they have sufficient information regarding the recycling service and, information sources.

The last item information examined what information sources were used and how easy these sources were to access.

Intention and closing questions

A final set of questions were asked to complete the interview in terms of whether the interviewees felt more motivated to recycle more as a result of the interview. At certain stages the interviewer became an information source regarding council services and what new services were being provided. The interviewee was then asked through question 23 had the process affected their intention to recycle. Considering intention is a collective of affect, social factors and cognitive attitude covered by questions 5 to 16, this question was asked to see if the interview had resulted in a change and what factor specifically initiated this change if any. Finally, the interviewee was asked if they wished to add anything more to the interview in case any areas were missed.

The following sections provide a qualitative analysis of the household interview data in which the information recorded from the transcript was used to illustrate each interviewee's behavioural profile.

7.6 Qualitative analysis of data from household interviews

Qualitative analysis enabled each component of the TIB to be examined in greater depth providing information beyond a numerical preference based on an ordinal scale. The process involved coding of questions to the TIB model and analysis of the data which is covered in the following sections.

7.6.1 Coding of interview questions

Typically for qualitative analysis, the interview transcripts are coded in accordance with selected statements within the text to identify similarities between respondents. The basing of the questions on the TIB assisted the coding process in that many of the responses could be allocated to a particular TIB component, however, in some instances the response did not always relate to the TIB component. An example of this is from Q9, which addresses the TIB component personal norms "is recycling in your household a personal value" - the response to this question from one interviewee was "no I guess it's just a habit" and so addresses both the personal norm and habit components.

The analysis was conducted in two stages to:

- a) Examine the individual interview responses using the TIB framework to identify differences and to broadly characterise these patterns, and;
- b) Compare the findings from the quantitative analysis of data based on percentage of responses (proportion) with that of the qualitative analysis of data based on the household interviews.

7.6.2 Mapping of questions for analysis

For the initial stage of the analysis, a short and relevant quote obtained from each interviewee's response to the interview question, for each element of the TIB was mapped for each respective interviewee. This provided a set of 'pen portraits' numbered in accordance with their panel number from the 2006 survey for cross-referencing of data for each interviewee, (which were used to identify similarities and differences in response patterns). No more than two to three quotes per TIB component were used. For example facilitating conditions would include an extracted quote representing 'awareness', 'information' and/or 'encourage'/'discourage' responses. This enabled both the benefits and downsides of household recycling to

be visually presented in terms of all the motivators/enablers and demotivators/barriers, for each interviewee.

7.6.3 Analysis of interviewee responses

The objective of this exercise was to provide a means to illustrate the respective behavioural determinants of household recycling for each interviewee and to broadly characterise each interviewee through the examination of observed differences and similarities between the participants. This provided a richer understanding of behavioural characteristics beyond that based on proportion of responses, as provided from Phase II, Chapter 6. Furthermore each participant was treated individually and was not regarded as part of a sample group derived from the response to a single proxy question representing claimed behaviour (as in Phase II). The resultant profiles or 'pen portraits' therefore provided a brief visual narrative of behaviour representing each interviewee's current²⁴ 'mindset'. The following section includes a descriptive analysis of the 8 individuals interviewed set out in figures 7.2 to 7.9 in terms of their influencing characteristics as set out in the TIB framework. This information includes positive (benefits) and negative (downsides) aspects of household recycling for each interviewee which are shown on each pen portrait in black and red respectively.

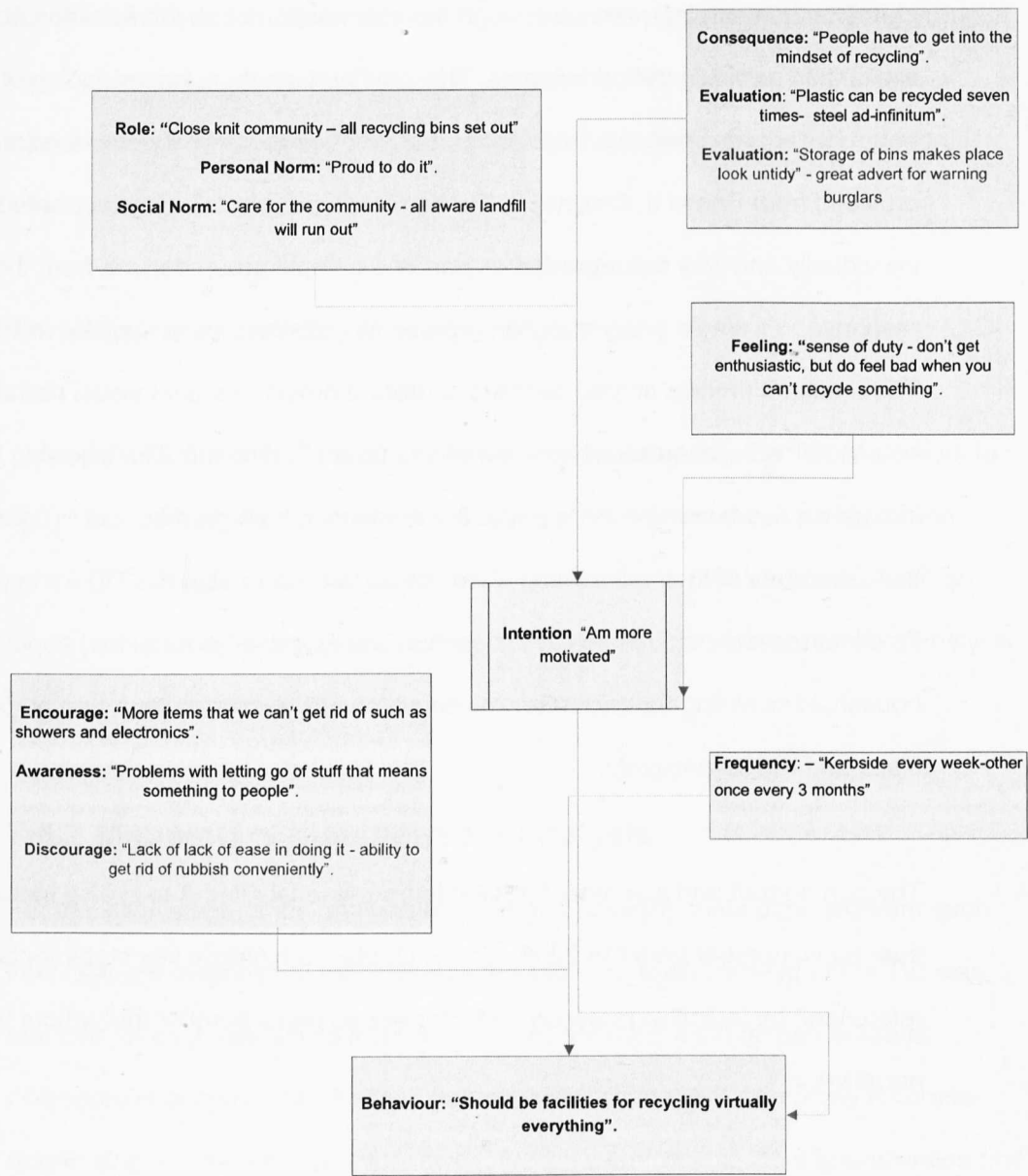
The pen portrait and summary for each interviewee labelled A to H also includes their panel number from the 2006 survey. Quotes to highlight key statements are referenced by interview question and interviewee panel number throughout the narrative.

Interviewee A (Panel No 258): From Figure 7.2, this interviewee suggests that people need to adopt a particular state of mind to benefit from the consequences of household recycling.

²⁴ Interviews represent claimed behaviours and attitudes/opinions held at current time

Figure 7.2: Interviewee A (Panel No 258)

Phase 3 Household Interview- No 258



The evaluation of these consequences once this mindset has been attained is that materials can be recycled a number of times saving on use of resources with plastic and steel cited as examples:

Recycling glass is good, steel can also be recycled ad-infinity. High grade plastic can only be recycled 7- times, hence 'seven years grace' (Q5, No 258).

The perceived downside, in terms of the perceived consequences of household recycling were associated with a negative visual impact of recycling containers creating an untidy image. Another downside was associated with compromising household security where containers which are left out may attract burglars.

Feelings or 'affect' focus on a sense of duty to recycle with the respondent feeling bad or frustrated at not being able to recycle something:

Not just a matter of course, sense of duty but don't get enthusiastic. Don't feel good but feel bad when you can't recycle something (Q16, No 258)

Social aspects reflected a sense of duty at community level, which is closely knit with community members believing they can 'do more', which is represented by the statement:

This is a close knit community and we see most of the recycling bins set out but we could do a lot more. If we are filling up land with people then we are going to have less land to live in (Q12, No 258)

The above response reflects a strong role within the community toward household recycling, which was supported with having less land to live in if we are filling up land with people and hence more waste. This strong role combined with a positive attitude from the individual suggests that they have made household recycling a personal norm in that they are 'proud to recycle'. This statement was backed up from,

influence in Northern Europe where the interviewee was subjected to a strong social norm toward recycling. The social norm however was compliance with a strict edict that if people failed to use the service correctly they would be fined. This suggests that the social norm may be a prescriptive norm reflecting the moral rules and guidelines enforced upon the community in Finland. The norm of social obedience reflected in the Milgram (1963) experiment was designed to observe an individual's compliance with an authority figure. Self-identity for the activity of recycling was reflected in a strong care by the individual for the community and for the environment in terms of landfill of waste affecting current and future generations. The interviewee also saw themselves as someone who is concerned with the neighbourhood and the environment, thereby reflecting a strong sense of self-identity. This interviewee was strongly motivated and hence a strong intention to recycle would be expected.

In terms of habit, kerbside recycling was undertaken on a regular weekly basis, with other types of materials such as batteries, being delivered to the recycling centre on a quarterly frequency. Unwanted items such as appliances and clothing were reused through passing on to other family members. Influence to recycle by family and friends suggest a strong element of social diffusion in this household.

The facilitating conditions were predominantly positive in terms of enablers with encouragement factors being associated with recycling items less frequently collected. An example was the suggestion for a community collection of things placed at the end of the street again reflecting the strong community influence:

More facilities for things less frequently collected – even at the end of the road. Something for the whole village (Q18, No 258)

There was a high level of awareness demonstrated by the interviewee regarding how to dispose of their recyclables and they felt they knew all they needed to. Comments

were made on the use of plastic bags and that people had problems letting go of stuff and hoarding rubbish they don't know how to dispose of:

People get enthused to begin with but interest drops off with lull in information. This will get rid of other junk – stuff people don't know what to do with. People tend to hoard rubbish ...they don't know what to do, clearly the letting go of stuff that means something to people (Q20, No 258)

Downsides of household recycling in terms of facilitating conditions included lack of ease or 'convenience' and infrequent collections as barriers to participation. A reference to the 'community skip' service in Northern Europe was cited as an effective means of encouraging participation and reducing fly tipping. A lack of standardisation of bin colours was suggested as a cause of confusion to people who are moving from one local authority to another, where recycling schemes and bin colours may differ. From a claimed behaviour perspective, based on the response as to why they selected "recycle everything they can" from the pre-questionnaire, this was explained as being able to recycle a wide range of materials. The interviewee was not self-restricted to just kerbside recycling participation and suggested that there should be facilities for recycling everything.

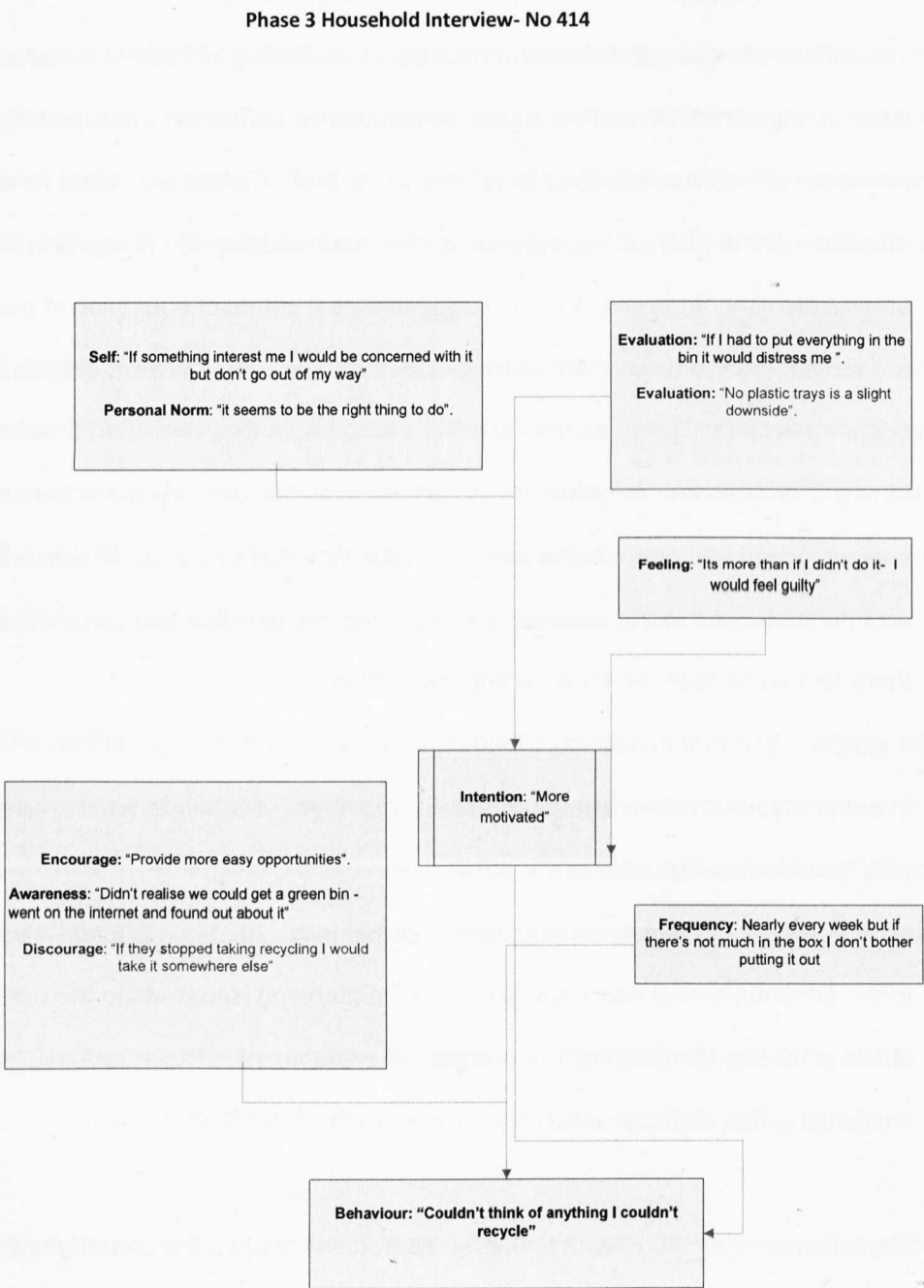
In summary, this interviewee expressed a strong personal norm for recycling with a very good knowledge of how the service works and offered suggestions for improvements of the service (e.g. colour coded bins). The individual felt strong links to the community and was heavily involved in planning issues citing the area was about to be dug up referring to a proposed development in the area and their role in challenging that development.

The interview was the only one which was not recorded as the property was located in the area of the flight path for a major international airport. This made recording of

the interview impossible due to the high noise levels from planes approaching the nearby airport (in excess of fifteen during the course of the interview).

Interviewee B (Panel No 414): Figure 7.3 shows the pen portrait for this interviewee.

Figure 7.3: Interviewee B (Panel no 414)



Perceived consequences were focussed around a belief of keeping things clean and tidy, where everything is put in its place to avoid clutter, albeit systematically through recycling:

It gets rid of things and I don't like waste so if I had to throw everything in the bin well it would distress me as I have been brought up not to like waste (Q5, No 414).

The perceived consequences in terms of downsides of recycling include not being able to include mixed plastics in the kerbside service. However, this may also be an example of a facilitating condition regarding a barrier to recycling mixed plastics being used as a response for a downside to recycling in terms of cognitive attitude:

There are a few things that you can't put in the boxes such as plastic trays which is a slight down side (Q7, No 414).

In terms of feelings, a sense of guilt was inferred, which is more associated with the breaking of a personal commitment than a routine and may reflect a personal norm. The response to the personal norm questions was recycling being the right thing to do which was cited as a personal value at an early age. The feeling of guilt of not recycling may reflect the emotion from the breaking of a personal value:

I am so used to doing it; it's more than if I didn't do it I would feel guilty. I don't get too concerned about the odd yoghurt pot (Q16, No 414).

It seems the right thing to do. Before we had boxes I used to take things to school on my bicycle (Q9, No 414).

From a social norm and role perspective the personal norm appeared to override any influence from family or friends in that they were the influence in the household to recycle and if they did try to discourage this individual it would not stop them recycling their household waste. There was not a strong sense of community involvement with this interviewee who responded to Q12 that that “people are all different” and Q14 “there may be some people who do not recycle in the community”. Self-identity identified that recycling is a good example for the world community making a link from the local to global concept of sustainability. When asked if they were someone who was concerned about the community/environment their response was:

If something interests me I would be concerned but would not go out of my way. Don't do so much now as don't have children at school, (Q15, No 414).

Kerbside recycling was undertaken on a regular weekly basis, with other types of materials such as batteries, being delivered to the bring banks occasionally. Charity shops were however visited several times per year. The individual however did not express this behaviour as habitual:

Nearly every week, but if there's not much in the box then I don't bother putting it out. It varies a lot, recycling banks not very much as it goes in the boxes. Depends with charity shops, several times a year (Q4, No 414).

Facilitating conditions were predominantly positive as for the previous respondent, citing the provision of more easy opportunities and additional materials for recycling at kerbside. Discouraging factors include personal time and drop in performance of recycling collection; however this did not discourage participation in the scheme:

More easy opportunities. Two boxes are fine. Don't like them throwing them on the pavement (Q18, No 414). If I was too busy to wash out. If they stopped taking, I would take it somewhere else (Q17, No 414).

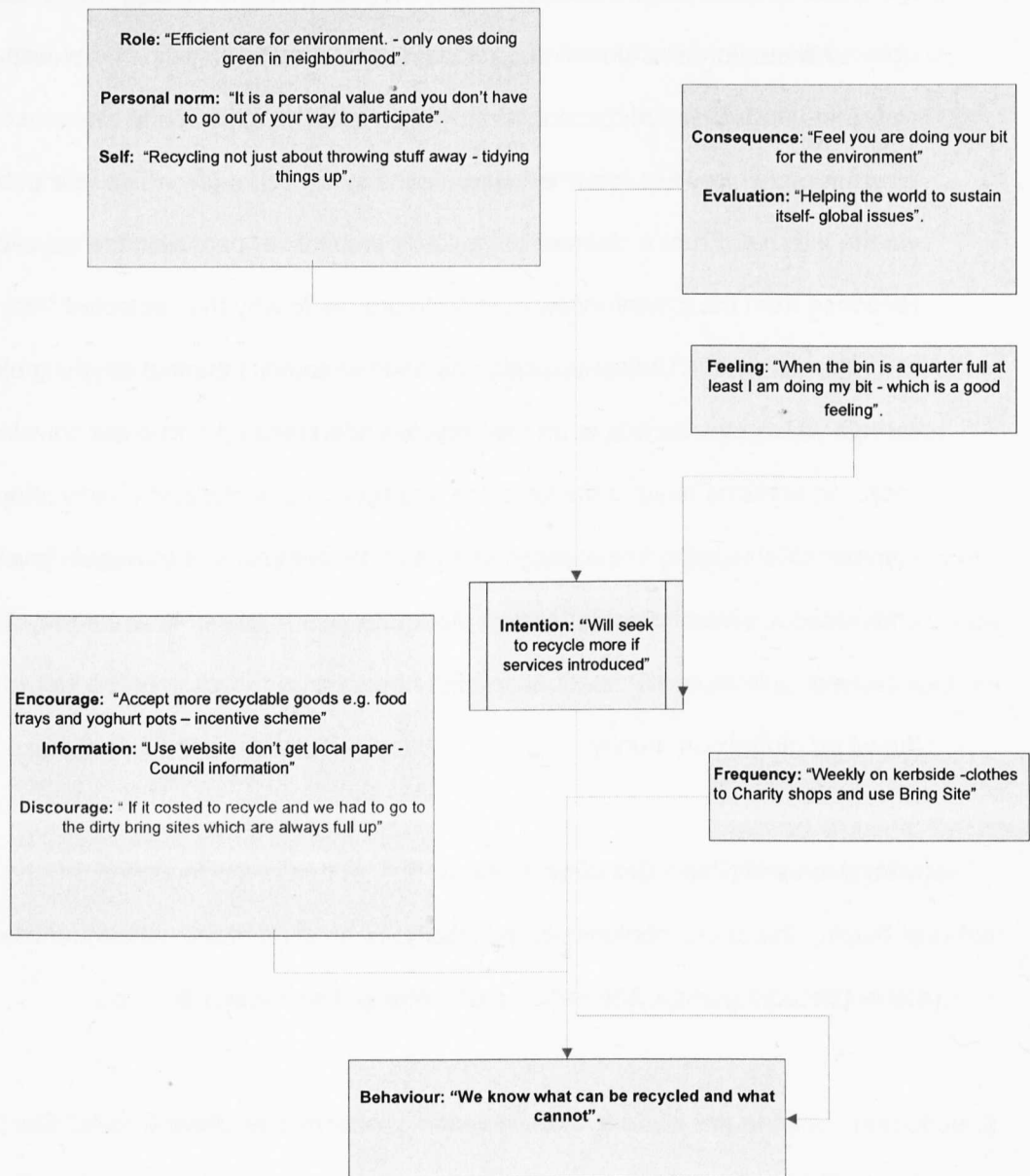
This reflects the convenience factor as an enabler to participation. There were moderate levels of awareness of the recycling programme and use of the internet to obtain information was identified but local news in terms of radio and newspapers were not used. The participant had however recently signed on to the household waste recycling reward scheme being trialled in the Borough, which was publicised via the internet. From a claimed behaviour perspective, based on the selected response from the pre-interview questionnaire, as to why they selected "recycle everything they can", this was explained as they couldn't think of anything else to recycle which may be due to an incomplete understanding and wider knowledge of recycling services beyond the kerbside and recycling banks and charity shops. To summarise, this individual expressed a personal commitment to recycling with embedded routines combined with a moderate awareness of how the recycling schemes operate and an evaluation of the benefits of recycling to the individual and the wider global community.

Interviewee C (Panel No 205): In Figure 7.4, attitudes are focussed around a belief of helping the cause of global sustainability. Evaluation of the consequences of this belief placed a personal importance on helping the environment:

Helping the world to sustain itself – global issues. Save Council Tax (Q5, No 205). Personal importance and you feel you are doing your bit for the environment (Q6, No 205).

Figure 7.4: Interviewee C (Panel No 205)

Phase 3 Household Interview- No 205



Feelings substantiated the above beliefs with regard to helping the environment and provided a link between local activity in terms of recycling and the impact on the environment. Other sustainable environmental behaviours were referred to including carbon management to reduce fuel costs:

Feel as if you are doing something to help the environment. When the bin is a quarter full at least I am doing my bit which is a good feeling. Other activities include vegetable garden (we have 2 composters). Energy Advice Officer doing survey of house, obtained grant for carbon emissions. All under umbrella of environment and helps to stop price of gas and electric going up (Q16, No 205).

From a social perspective, the role element for this interviewee was more associated with the global environment than the local community. However, local activities including participation in schools and church activities were mentioned. Emphasis was placed by the interviewee on the visual impact of litter cluttering up the local environment with a clean environment making for a healthier place. This also suggests a strong link of the local to global issues in terms of sustainability:

Efficient care for the environment....only ones doing green in neighbourhood (Q12, No 205). Because litter makes the place look ugly and a clean environment is a healthier place (Q15, No 205).

Social norms were driven internally within the household, with no stated external influence; however, there was evidence of a strong personal norm in operation fuelled by care for the environment and the fact it is convenient and does not cost anything suggesting a prescriptive norm is driving the personal norm:

Internally driven in household. Neighbours do their recycling and sometimes find a chore but no influence on us (Q10, No 205). Yes it is a personal value and you don't have to go out of your way to participate. It doesn't cost anything so why not? (Q9, No 205).

This interviewee did express a motivation and would be willing to do more if more services were introduced. This prompted a request by the interviewee following the interview to discuss what Council services were available and what are planned. The nature of this discussion was information from the interviewer as a waste practitioner and therefore was excluded from the transcript. However, this request in itself suggests a very strong intention to recycle as much as possible for the underlying factors stated. From a habit or routine perspective, recycling is done weekly at kerbside with textiles disposed of via the Charity shop route and use of the bring sites.

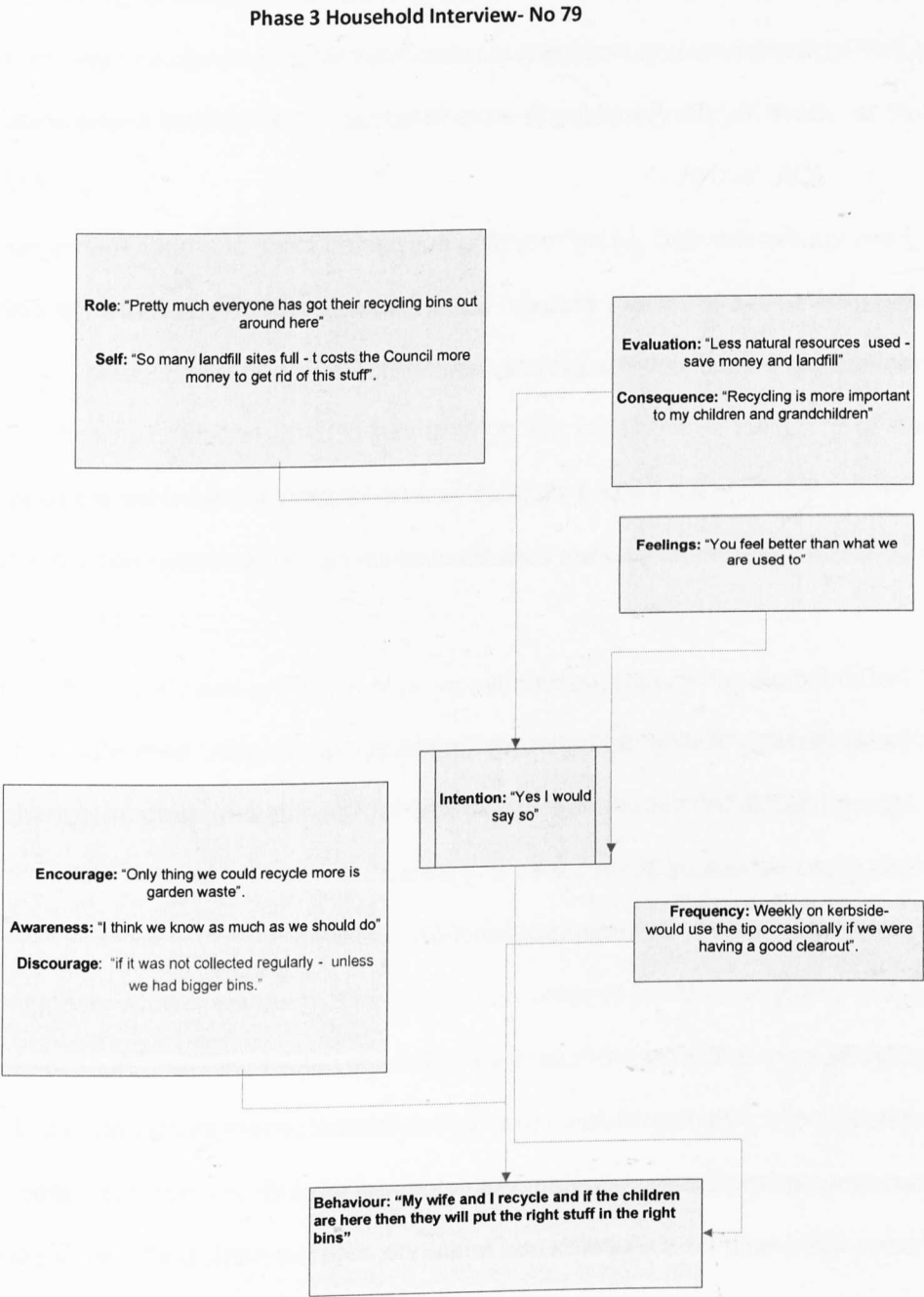
In terms of facilitating conditions, emphasis was placed on recycling beyond the normal or mainstream kerbside collected materials with suggestions to encourage based on collecting mixed plastics (food trays, yoghurt pots). Discouraging factors were economically based and convenience:

New incentive bin scheme will help. Accept more recyclable goods e.g. food trays and yoghurt pots (Q18, No 205). If it costed more to recycle and we had to go to the dirty bring site, which are always full up – cartons are an example (Q17, No 205).

Information was obtained using e-media and use of the website, also the Council's magazine 'Around the Royal Borough'. Awareness was very brief stating that they were very aware of the service. Downsides to the service in terms of facilitating conditions included paying for recycling and having to go to bring sites which were not maintained. This mirrors the local environment quality importance factor stated earlier. From a claimed behaviour perspective, the reason why they selected "recycle everything they can" on the pre-questionnaire was that they know what can be recycled and what cannot, which supports the very aware claim. This is exemplified

from a personal commitment and embedded routines combined with a reasonable knowledge of how the schemes work and the benefits of recycling to the individual.

Figure 7.5: Interviewee D (Panel No 79)



Interviewee D (Panel No 79): This interviewee, whose pen portrait is illustrated in Figure 7.5 stressed upon the impact of current waste related activities on future generations as an evaluation of the consequences or 'outcome' from recycling. The

interviewee felt that recycling was more important to their children and grandchildren, which may also be representative of an emotion or affect. Perceived consequences of recycling focussed on recycling using less natural resources thereby reaping the economic benefit ensuing from this:

One would hope less natural resources would be used up, save money and save landfill. Recycling is more important to my children and grandchildren
(Q5, No 79).

Feelings experienced during recycling suggested more of a habit than a personal commitment which others stated. This was reinforced when asked if the activity was something the individual personally wanted to do with the reply being:

No, it's just a habit, I suppose you feel better than what we are used to. Have a water meter and am conscious of energy conservation (Q16, No 79).

Social factors reflected a prescriptive norm in which the interviewee referred to all of the community setting out their recycling bins, and recycling being considered a "good thing" in the community. In terms of self-identity or appropriateness to adopt this given behaviour, the reasons suggested were landfill space running out and the resultant economic disbenefits in landfill of waste.

Clearly, economics was a driver for this interviewee as was for other interviewees. The individual also considered themselves as someone actively concerned with the community and the environment. Social norms were driven internally within the household, with no stated external influence, with the participant claiming that they would still recycle even if their neighbours did not. This individual did claim they were motivated to do more in the future but did not elaborate on specifically what they would do so. In this regard, there was a strong intention to recycle as much as possible; however, the activity itself appears to be driven through routine. In terms of

facilitating conditions, the interviewee could not think of any more materials that should be recycled other than garden waste but referred to mixed plastics as a second thought. They then asked why these materials were not recycled which was discussed separately from the interview as it related to Council business.

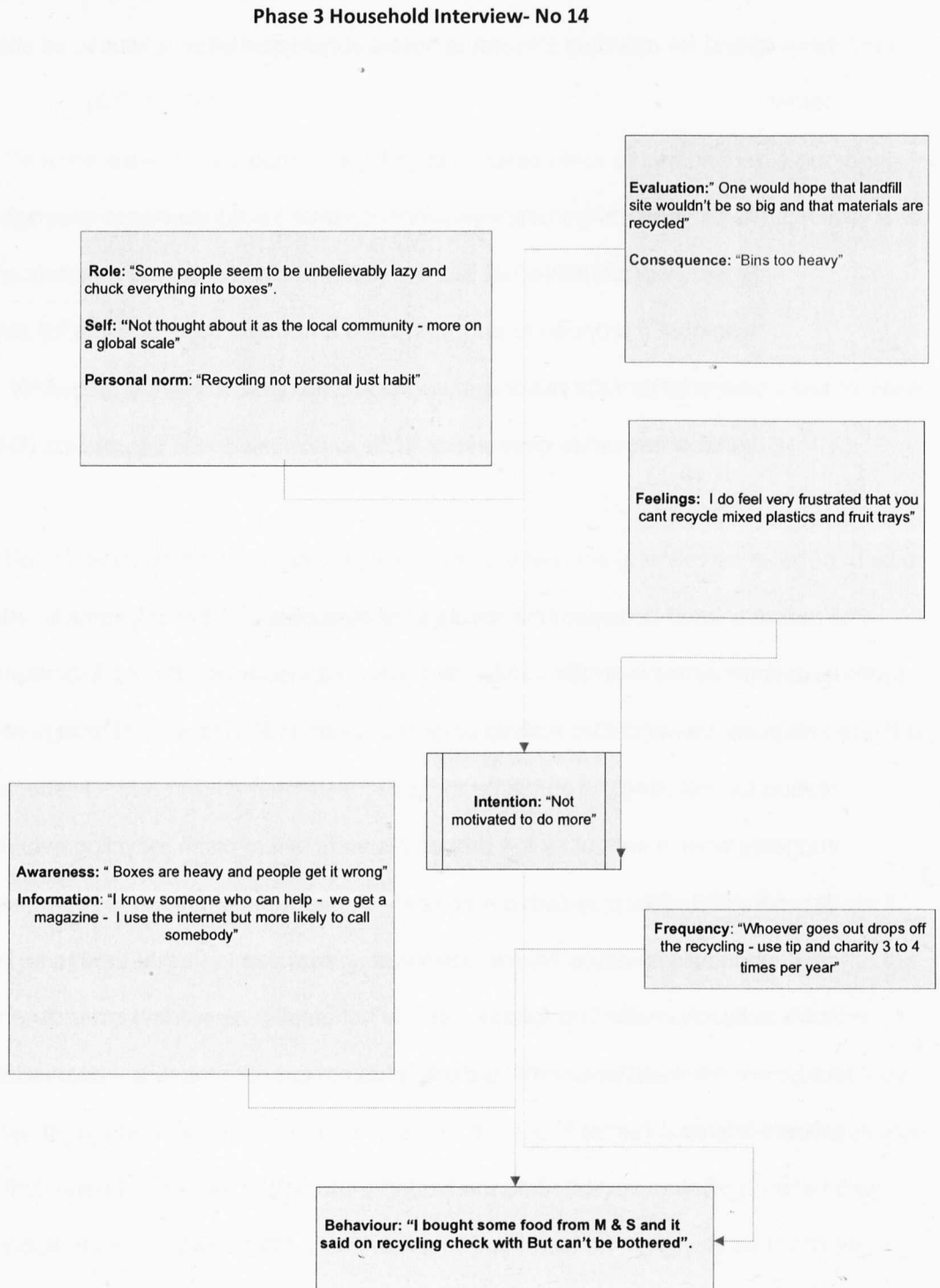
Discouraging factors include a reduction in collection frequency (RBWM collected on a weekly basis); however, if more materials and larger containers (wheeled bins) were issued for recycling this would not be considered as problematic as stated below:

Most of the things seem sensible however I suppose things like yoghurt pots would help (Q19, No 79). I suppose if it was not collected regularly once a week but it dropped to less than once a fortnight there is a lots' of stuff to be recycled and the paper and cardboard box gets full up pretty quickly. If service was cut to once every 10 days unless we had bigger bins (Q17, No 79).

From a claimed behaviour perspective, all members of the family recycle in the household which includes all kerbside collected materials but not bring sites and only occasional use of the household recycling centre (HRC) for clearout purposes. The reason for selecting the option on the pre-questionnaire was a short response. This suggests what is set out by the property is sufficient to claim recycling everything they can. Materials recycled at kerbside included the mainstream paper, glass, cans, plastic bottles with other materials cited as no real need as what they have is what is collected each week. This interviewee did not display a personal commitment but had embedded routines combined with a commitment to these despite social influence to do otherwise.

Interviewee (Panel No 14): From the profile of this interviewee shown in Figure 7.6, the evaluation of the consequences is aspirational in that they hoped the landfill sites would not be so large that materials would not be recycled.

Figure 7.6: Interviewee E (Panel No 14)



This appears to a perception that as long as there is abundant landfill capacity then there would be less emphasis on recycling. Perceived consequences were focussed on excessive consumption of resources by households in general and not just the individual and their household. Downsides of the perceived consequences of recycling were focussed on a personal basis suggesting the bins for some people may be too heavy to lift. As the Council used 55L boxes to collect recycling at the time this comment was aimed at the type of container being problematic for some individuals:

Hugely important because we consume far too much stuff that it's obscene
(Q6, No 14).

In summary the interviewee appears to have a strong attitude which is reflected by the need to do more, which due to the strength of this statement may indicate the presence of a personal norm. Feelings reflected frustration at not being able to recycle other materials such as mixed plastics and suggested that certain containers should be more environmentally friendly packaged as suggested by the following statement:

I do feel very frustrated that you can't recycle mixed plastics and containers that contain fruit. I hate having to put this in the bin. Should our yoghurts come in cardboard containers? Have on occasion been very eccentric standing in Waitrose and tearing off all the packaging but feel a complete nutter! (Q16, No 14).

This individual appeared to be strong-willed in their actions such as the action taken at the checkout, but had secondary thoughts regarding the action taken. Social

factors suggested a take it or leave it approach to recycling from their neighbours and the Council, which is summarised from the statement:

Some people seem to be unbelievably lazy and chuck everything into boxes. I don't think authority takes a lot of care with the environment. In Sydney it looks like egrets in the trees but it's actually white plastic bags (Q12, No 14).

Beyond this however, involvement and concern for the local environment was absent with more concern over the global environment. References were made to other environmentally sustainable activities such as energy conservation, waste composting and cycling. Social norms were internal with discouragement of recycling from external sources strongly resisted reflected by the statement:

I know my neighbours and we get the Guardian all the time then pass it on to them. I don't think anyone would dare to discourage me from recycling (Q11, No 14).

The social norm in terms of recycling was perceived to be very strongly established in that the neighbourhood and when asked what characteristics people who did not recycle their waste displayed the response was:

This is too middle class a neighbourhood and everyone recycles. I wouldn't really know people like that person who lives in Shepherds Bush who is very frugal, lives in a basement and does not recycle (Q13, No 14).

When asked is recycling something they personally wish to do, their response was that it was not a personal value but more of a habit on their part in that it was something done as an everyday activity. This interviewee held strong commitments toward personal activity which may be due to taking a stand on a matter which was

of personal value; however, with recycling this was regarded as a routine activity for which no particularly strong personal values were held. The individual was also not motivated to do more in terms of recycling. Recycling was regarded by the individual as a normal activity in the neighbourhood with the exception of a minority group. There was also much less passion and expressed involvement in the community from this interviewee compared with other interviewees, suggesting role was not a major influence to recycle. Routine was fairly regular with kerbside recycling and infrequent trips to the Council tip (HRC) and to charity shops (3 to 4 times per year). Facilitating conditions in terms of encouragement did not reveal anything additional from the mainstream other than the garden waste subscribed scheme being promoted that year. Awareness was average to low with no active searching for information:

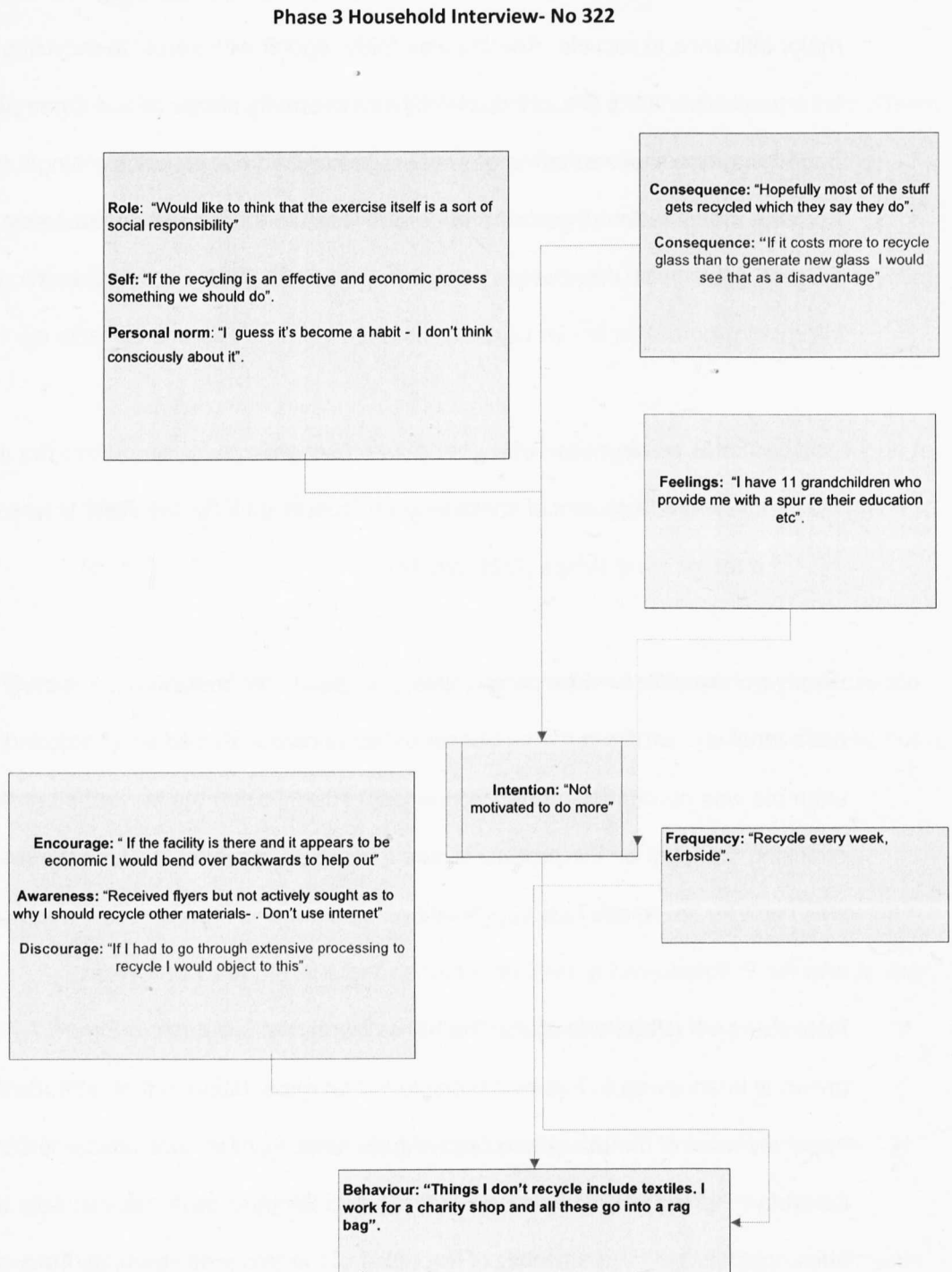
I know someone we can get help and we get a magazine. I use the internet but more likely to call somebody and ask them. Use the RBWM website quite a lot for other things (Q21, No 14).

From a claimed behaviour perspective, the reason for checking the "recycle a lot but not everything" on the pre interview questionnaire was due to effort required. An example was purchasing of goods in a local supermarket the instructions referred to checking the label on the product to see if it can be recycled in which the response was can't be bothered. This suggests participation is limited by effort involved

Interviewee F (Panel No 322): The behavioural profile set out in Figure 7.7 like the previous interviewee in Figure 7.6 displayed an expectation in their attitude that hopefully most of the material collected gets recycled. This was cited in the belief that recycling is a benefit to everyone including themselves. However, negative attitudes included a questioning of the belief of the economic benefits from recycling. Clearly a balanced view point on recycling was expressed with this interviewee with

emphasis placed on the economic aspects of sustainability than that of the environmental issues. Feelings were generated in terms of future generations' impact from recycling activity, but again not on the self:

Figure 7.7: Interviewee F (Panel No 322)



I guess thinking in terms of motivation I have 11 grandchildren who provide me with a spur regarding their education (Q16, No 322).

Social factors included seeing recycling in terms of a social responsibility which is what their neighbours do and the rationale was that it is a sensible and worthwhile exercise. The interviewee was more focussed on operating higher up the waste hierarchy and cited reuse through repairing things a common practice. With regard to recycling of waste being a good example of caring for the community and environment, the response appeared to question the efficacy of recycling. This was apparent in the statements:

I would like to think that the exercise itself is a sort of social responsibility and I guess that from my neighbours they consider it a sensible and worthwhile exercise (Q12, No 322). If recycling is an effective and economic process then it's something we should do. It would be caring for the environment to save landfill (Q14, No 322).

Views held toward people who did not recycle were strongly held in that they would be at the 'anti-social end of the spectrum'. Finally, on social factors the social influence of recycling was seen as a lifestyle consumer driven choice but not a personally held value. The interviewee expressed that they don't think conspicuously about recycling as they used to. No additional motivation was expressed furthermore the individual required convincing of the economic benefits of recycling, which were given greater priority than environment or social factors.

When asked whether recycling is a personal value, the interviewee replied that it was more of a habit and that they do not consciously think about recycling. In terms of

frequency of recycling, this was undertaken regularly at the kerbside every week. No mention was made regarding use of the bring banks or the Council recycling facility (HRC). Facilitating conditions in terms of encouragement to recycle more were met with a preference of reuse of waste materials over that of recycling:

If you wander round this house I repair everything. I don't chuck anything out.

If the facility is there and it appears to be economic I would bend over backwards to help out (Q18, No 322).

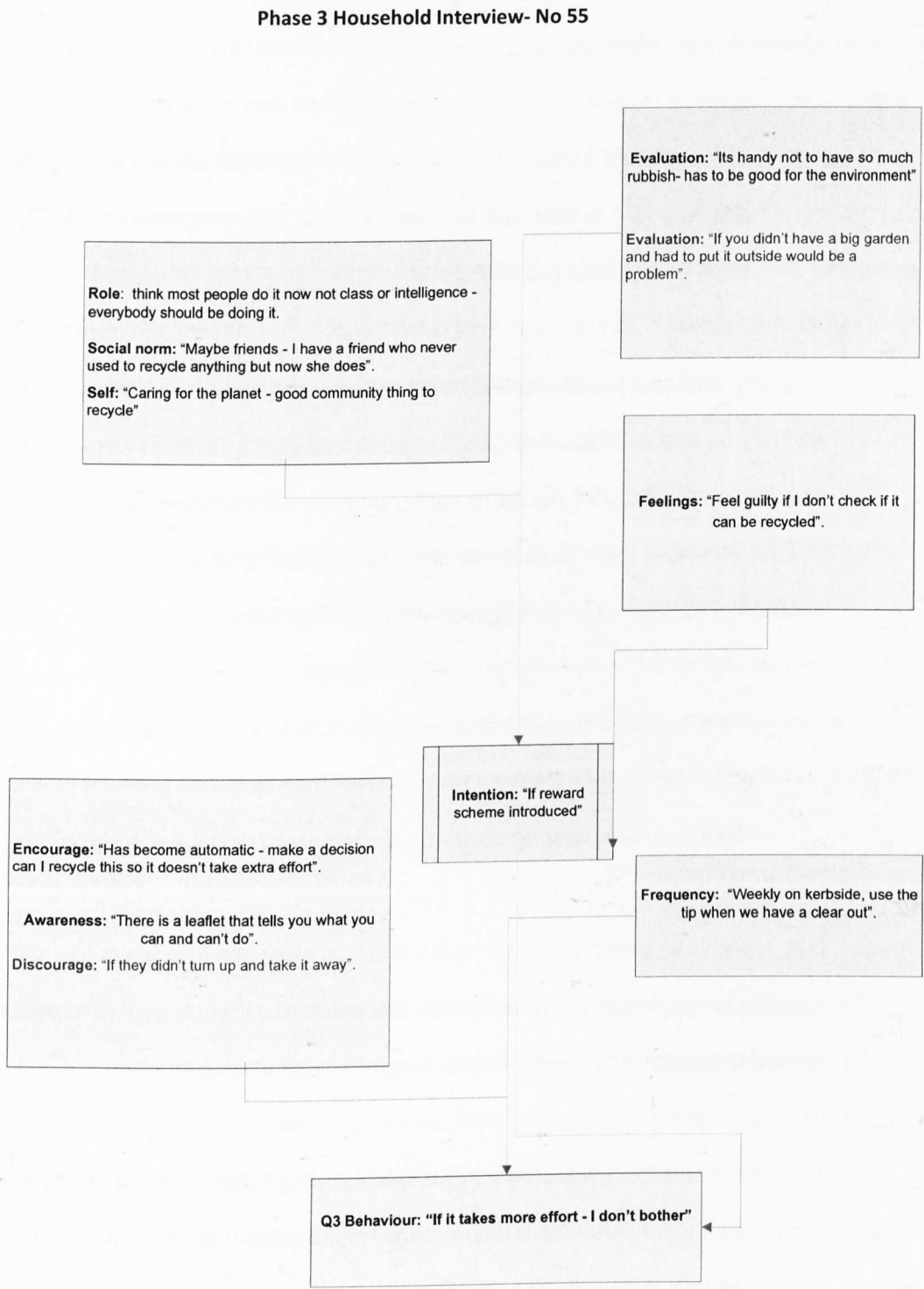
Discouraging factors included effort with having to manually sort recyclables. Clearly in terms of participation this individual required convincing of the economic benefits in order to provide support. With regard to awareness, this was based on what was received by the individual through various means such as the mail or 'flyers' posted through the door. The individual did not actively seek information to increase awareness and knowledge of services and they did not actively use the internet:

I have received flyers through the mail but not actively sought as to why I should recycle other materials (Q20, No 322). Don't use internet for this, information is pinned on notice board (Q21, No 322)

From a claimed behaviour perspective, this individual checked the 'recycle a lot but not everything' on the pre-questionnaire. Textiles were not recycled through the bring sites but through the charity network. The individual worked as a volunteer for a charity shop and suggested that a better means of disposal is through this outlet instead of taking them to a textiles recycling bank. Although the charity networks tend to reuse clothes as opposed to recycling them (depending on their condition) most people using the charity shops still tend to refer to this as being a recycling activity. The interviewee when probed further was aware of recycling banks;

however, as their preference was to reuse items as opposed to recycling them they were aware of the difference in charity shop recycling and bring bank recycling for textiles.

Figure 7.8: Interviewee G (Panel No 55)



Interviewee G (Panel No 55): The profile of this interviewee is shown in Figure 7.8.

This individual's attitudes reflect a belief that recycling is good for the environment but they are not familiar with what actually happens to the materials collected for recycling. There is a universal belief held that anything which stops landfill (perceived to be a bad thing) is good for the environment. Evaluation of the consequences in terms of advantages includes schemes which encourage people to recycle beyond the kerbside:

Personally its handy not to have so much rubbish but has to be good for the environment, landfill and all that, but don't know personally what happens to all this recycling (Q5, No 55)

Negative attitudes toward household recycling were associated with spatial factors and having space to place recyclables in. With regard to affective or feelings, guilt was expressed if the wrong items were placed in the recycling box or recyclables thrown into the refuse. Other environmentally sustainable aspects were highlighted in terms of concern over energy and water conservation:

I do feel good actually. Also put a few things in the bin and if not checked then feel guilty if I don't check it can be recycled. We tend not to have the lights on, turn heating down to save money. Don't have sprinklers on (Q16, No 55).

Social aspects focussed on the social community as a whole and not specifically toward the local community. The statement below reflects this view:

I think most people do it now not class or intelligence but the fact that everybody should be doing. I don't just do it for the convenience, our bin is always quite full (Q12, No 55).

Continuation of the individual's self identity focused on caring for the planet and being a good community by recycling. The positive community spirit was reflected in the interview along with local environmental quality issues such as concern over dog fouling. Social influence was marginal from friends with some personal values placing importance of recycling. Motivation was supportive of doing more and an offline discussion was requested after the interview to discuss the Council's new subscribed garden waste kerbside collection service and incentive scheme. As this was in the researcher's waste practitioner capacity the details were not recorded. This interviewee however clearly held a strong positive attitude toward recycling and extolled personal values making the link between global and local issues. Recycling frequency was weekly with occasional clear outs at the tip. Clothes were taken to the charity shop. Awareness in terms of knowledge of the service and of the recycling process was limited. This was evidenced from the statements:

I know there is a leaflet that tells you what you can and can't do. I am sure you can find it on the Council's website but I don't use it to check on recycling... Quite interested to know where it ends up. More information on what happens to it would encourage you to do more. Maybe people would change their ways and help people to make up their mind to wash a tin (Q21, No 55).

The last statement suggests a genuine interest in improving awareness and finding out more on what happens to the materials that are collected for recycling. It was also considered by the interviewee as a useful means of changing behaviour if people knew where it ended up. Demotivators included service quality such as if the collectors did not turn up (missed bins) and enforcement of contamination of recycling bins, but would not stop this individual from recycling. Claimed behaviour

from the pre-questionnaire stated “recycle a lot but not everything” with the reason given being based on level of effort.

Interviewee H (Panel No 1): This interviewee whose profile is illustrated in Figure 7.9, did not see any personal benefits of recycling as a household activity, with their evaluation of consequences of recycling formed out of the overall encouragement to recycle from a wide variety of sources. The perceived consequences of recycling were associated with a realisation that not all items can be recycled and that some materials such as residual waste cannot be recycled. This suggests the interviewee was familiar with recycling beyond the household and on probing was involved in the industry.

I don't see any benefits to us as a household but I think we do because we are encouraged to recycle (Q5, No 1). Some things can't be recycled and you are sorting out all the time as you put something in the box and my wife will say “you can't put that in there, they won't take that” (Q6, No 1).

Demotivators toward recycling included a lack of personal convenience expressed due to the weight of recycling boxes filled with heavy materials presenting a barrier to participation by the individual. Feelings toward recycling were non-existent and the activity was done purely out of routine. Social factors from a community perspective were associated with negative experiences presenting a barrier to recycling. An example was given in which their friends had the contents of their recycling boxes smashed. Other barriers cited were poor access for leaving bins out for collection. The interviewee did not express when asked any ongoing links with the local community and suggested that benefits to the environment were more associated with the younger generation. The individual also suggested that negative publicity involving recent features in the media in which recyclables were being sent to China also did not help the image of recycling:

Read Daily Mail and some Council has mixed it all up again and people ask why we are doing this and hearing of container loads of paper going to China. However China don't have much in the way of forests so it helps (Q15, No 1).

With regard to influence from social norms, this was cited as being driven from within the household and not from external sources (friends, neighbours). Personal values regarding recycling were absent as represented from the statement and the activity was regarded as more of a habit:

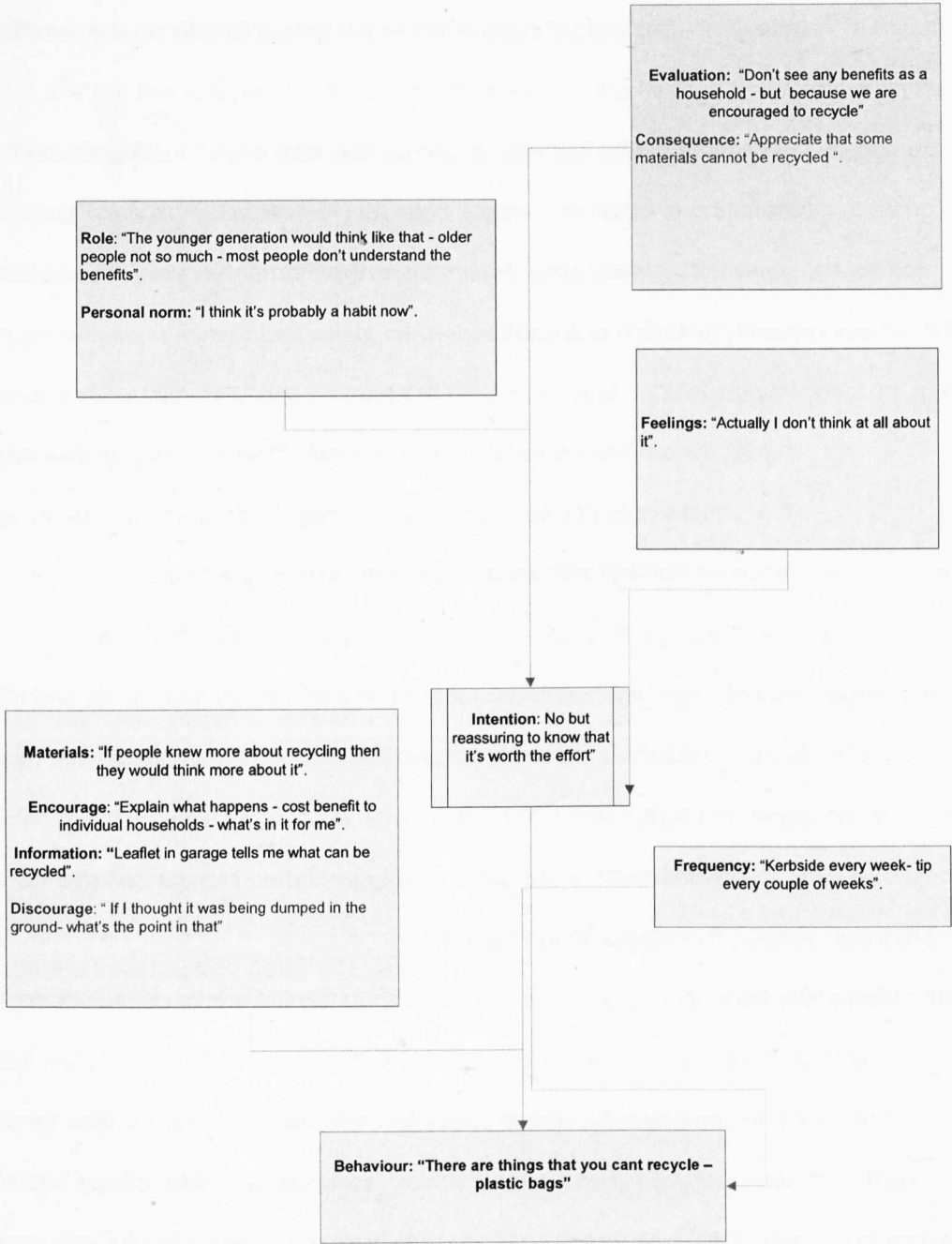
I think it's probably a habit now. I do most of the washing up and everything that's there gets washed up. Garage straight off the kitchen easy task, however outside of back door I wouldn't do it (Q9, No 1).

Frequency of recycling included weekly set-out of kerbside materials and taking of other items to the local tip (HRC). Awareness of recycling was high with this interviewee and suggested that more interest and participation in the scheme would happen if people knew more about recycling promoted in a serious manner via a news article. This would focus around the economics of recycling and the cost benefit to households:

It wouldn't be a bad thing if people knew more of a story about the whole thing (recycling) and was done very seriously would help people think more about it. The other thing is to explain what happens and the cost benefit to individual households and what's in it for me. For example if we landfill waste it costs so much but if we cut this down we have actually managed to reduce this amount of the Council budget. Nothing like getting people to do something with an economic incentive (Q19, No 1).

Figure 7.9: Interviewee H (Panel No 1)

Phase 3 Household Interview- No 1



Negative factors associated with household recycling included a perceived poor quality of service where for example if it was believed that recyclables were thrown in

with the general waste for whatever reason then this would prompt an angry response. If this continued then they would give up on participating in the scheme.

Information on the household recycling service was not proactively sought by this individual and reliance was placed on receiving information via promotional material provided through Council leaflets. If information was required then they would contact the Council directly.

From a claimed behaviour perspective, the interviewee ticked the “recycle a lot but not everything” explaining this response was selected based on their personal knowledge of recycling and that there are materials such as plastic sheeting and bags (can be taken at Supermarkets) which they dispose of via the refuse bin. Other items for recycling are taken by the individual to the Council tip (HRC). However, clearly convenience and level of effort required to recycle appear to play a large part as to the level of recycling activity this interviewee will go to.

7.6.4 Summary of recycling behaviour from household interviews

Examination of the patterns of responses from the above household interviews provides a clear picture of the drivers behind recycling behaviour for those people interviewed. The response from each interview is summarised below to provide an overview of recycling behaviour and to identify the recycling preference for each interviewee.

Interviewee A (Panel No 258): This interviewee expressed strong community values and prescriptive social norms in terms of what is done in the community regarding recycling of waste. They also expressed personal values toward recycling and toward other sustainable environmental activities such as water and energy conservation indicating a personal norm and spill over to other activities. The

interviewee also uses the Council's Household Recycling Centre (HRC) for disposal of items which are not collected via the kerbside recycling service. A high level of awareness toward recycling was identified with this individual, who viewed the recycling service as very convenient. A number of suggestions were also made by this individual to further improve the service and to benefit the local community. This suggests that the individual is interested in the service and has undertaken an evaluation of the consequences of improved recycling suggesting a strong positive attitude. The individual was not constrained (self-restricting) in terms of their recycling behaviour with an expressed desire to recycle more than the current service provided. This individual stated on the pre-interview questionnaire (PIQ) that they 'recycle everything they can' and the above profile would certainly support this.

Interviewee B (Panel No 414): This interviewee saw recycling as a domestic cleansing activity, personal values to recycle were expressed and guilt felt if they failed to participate in the recycling scheme. This individual claimed to use the recycling banks on an occasional basis and viewed the recycling service as convenient. They displayed moderate levels of awareness and did not exhibit self-restriction in their recycling behaviour. This interviewee on the PIQ stated 'recycle everything they can' although their behavioural profile is not as strongly positive as Interviewee A.

Interviewee C (Panel No 205): This interviewee worked as a local government officer in an environment department and expressed a clear understanding of sustainability and the global to local linkages from recycling of waste. Personal concern was expressed by this individual regarding the deterioration in quality of their local environment with emphasis on litter being a problem in the neighbourhood. Strong personal values in terms of care for the environment(s) were expressed. Charity outlets were used for disposal of textiles in addition to recycling banks for other materials. The individual demonstrated a good awareness of

recycling services and had a sound level of knowledge regarding recycling. Clearly this individual was not self-restricting in their recycling behaviour as expressed from their personal commitment and embedded routines. Although they did not suggest without being prompted changes to improve the service their behavioural profile is consistent with their stated behaviour as 'recycle everything'.

Interviewee D (Panel No 79): This interviewee was aspirational in their attitude with regard to the perceived consequences of recycling and evaluation of those consequences in terms of benefits to the environment and the neighbourhood from recycling. They also demonstrated community involvement reinforced by a prescriptive norm in terms of what is done in the community with regard to household recycling. There were no personal values associated with recycling from this individual but more a focus on economics as the key driver regards benefits to the environment. The interviewee uses the recycling centre (HRC) occasionally and was contented with their existing level of knowledge and awareness of recycling services. However, this knowledge on probing was limited when compared with other interviewees. This interviewee also showed some signs of self restriction in their recycling behaviour. Although they claim to 'recycle everything' their profile is more consistent with 'recycles a lot but not everything'.

Interviewee E (Panel no 14): This interviewee was forthright in their attitude toward recycling and was strong willed. They are not actively involved in local community activities but are aware of and subscribe to the community norm and the observed behaviour of others (descriptive norm) with regard to recycling. No personal values on recycling were expressed and recycling was regarded as a habitual activity. They used charity shops to dispose of clothing items and occasionally recycling centres for disposal of items not included in the kerbside service. Awareness was limited and information on the service was not actively sought. It was clear this individual was

self-restricting in their recycling behaviour and consistent with their claimed behaviour as 'recycles a lot but not everything'.

Interviewee F (Panel No 322): This interviewee was sceptical in their attitude toward the economics of recycling, and expressed a preference of reusing waste materials and preventing waste in the first place. They were not involved in the local community and when they recycle they do this out of habit if it seen as worthwhile on their behalf. Convenience is a discouraging factor as they do not see the service as being convenient. Awareness of recycling services was based on information provided through Council promotions with no active seeking of additional information on recycling. Effort was a major discouraging factor for this individual suggesting self-restriction toward recycling. This individual preferred waste prevention (reuse and minimisation) over recycling and their profile is consistent with their claim to recycle a lot but not everything.

Interviewee G (Panel No 55): This interviewee's attitude in terms of the evaluation of consequences of recycling was it is good for the environment, but did not articulate when probed why this was. Convenience was a major factor due to spatial (storage) constraints however some guilt was expressed if they failed to recycle their waste. The individual's focus was on the benefits of recycling to the wider community rather than the local neighbourhood suggesting a descriptive norm was in operation. Awareness was poor to limited with confusion over what to do with their waste. Demotivators to recycling included poor service quality. Clearly their recycling behaviour was dictated by the level of effort required indicating self-restraint and consistent with 'recycling a lot but not everything'.

Interviewee H (Panel No 1): The attitude toward recycling for this interviewee was that recycling is not personally beneficial, and is a routine activity borne out of habit. Some negative perceptions were expressed regarding perceived barriers to recycling

such as vandalism. The individual demonstrated a high level of awareness and knowledge of the recycling process including the economics of recycling but needed assurance that there is a cost benefit to recycling. The interviewee actually recycles as much as possible through use of recycling centres (HRCs), however effort on their behalf was a limiting factor. Although they claim to 'recycle a lot but not everything' on the PIQ, their behaviour is more suited to 'recycling everything'.

7.7 Comparison of interviewee responses based on TIB components

The above analysis shows that there were differences between the behavioural profiles for each interviewee. These profiles suggest differences in recycling behaviour for all the interviewees.

The next stage involved identifying key areas of commonality for each interviewee under each respective TIB component. This resulted in the emergence of two sets of behavioural determinants based on the behavioural profiles of the interviewees and labelled according to the level of self-restriction and effort required to recycle items. These are termed type A (Non-restricting) and type B (Self-restricting) respectively. Using this framework of behavioural determinants, each interviewee was then associated with one or other set of characteristics. The interviewees and which type of behavioural characteristics they exhibited are listed in Table 7.2 below with the panel number for each interviewee enclosed in parentheses.

Table 7.2: Household interviewees by behavioural characteristics

Type A (Non-restrictive)	Type B (Self-restrictive)
A (258), B (414), C (205), H (1)	E (14), F (322), G (55), D (79)

The comparison of sets of determinants identified as types A and B and the associated characteristics shown by the interviewees is summarised below for each TIB component:

Perceived consequences: the perceived consequences from recycling held from those individuals who complied with type A determinants, were focussed on the benefits of recycling to future generations, effective and responsible use of natural resources and personal benefits. Those with type B characteristics were less concrete in their attitude and were more aspirational in that there was an expectation of recycling of materials; however, there was a lack of understanding regarding the efficiency and processing involved. Interviewees with type B characteristics also did not see any personal benefits to recycling, other than being handy not to have so much rubbish.

Evaluation of consequences: attitude in terms of the subjective evaluation of the advantages and disadvantages to recycle household waste for individuals with type A characteristics suggested the use of education as a tool to change mind-sets. Emphasis was placed on the importance of recycling and "doing your bit". These evaluations were focussed on sustainability and benefits to future generations and consumer practices, thereby making a direct link between recycling and consumption. For individuals with type B characteristics, the evaluation process was less considered and more aspirational based on assumption and expectation that something should happen. However in terms of importance both types placed similar views on the subject as being of importance, which would explain the similarity of scores on a quantitative basis.

Affect: The 2006 questionnaire survey measured affect using a semantic differential scale based on the level of concern for various environmental activities. The interview questions asked how people personally felt in participating in recycling

reflecting the true element of the 'affect' component of the TIB. For individuals with type A characteristics, feelings were personal including guilt for not checking, sense of duty and feeling good when the results of a 'quarter-bin full' of residual waste is left. For individuals with type B characteristics, some feelings were expressed in terms of frustration in not being able to recycle a particular material (mixed plastic). These comments may however be directed toward the recycling collection agency (RBWM), as opposed to an internally driven reaction based on personal feeling. Other expressions were guilt for not checking and not feeling anything at all. The differences for this component are subtle but more passionate and heartfelt for individuals with type A characteristics over type B.

Social norm: An interesting distinction arose from this observation where the responses from the individuals with type A characteristics suggested a '*prescriptive*' social norm was in operation as an embedded activity with influence from a wide circle including external (neighbours, community) and internal within the household. Individuals with type B characteristics however displayed evidence of a '*descriptive*' social norm in which recycling was something which happened which is more of an observation than an established moral practice.

Role: The individuals with type A characteristics, in almost every case, highlighted the community cohesion element in terms of recycling in that everyone does this evidenced by everyone setting out their recycling bin. Conversely individuals with type B characteristics were at best aspirational toward community activities stating that they would like to see recycling as a sort of 'social responsibility', whereas at worst no involvement in the community. This reinforces the prescriptive versus descriptive social norms.

Personal norm: For individuals with type A characteristics, the interviewees in almost all cases displayed a personal commitment to recycling, whereas for

individuals with type B characteristics the activity of recycling was down to habit or routine with no underlying personal driver.

Self-identity: The question was based on whether the individual thought recycling was beneficial to the community/environment (activity) and whether they identify themselves as someone who is personally concerned. For individuals with type A characteristics, the responses expressed a concern, and the activity not just based on disposal (diversion) but of tidying things up suggesting care for local environmental quality. Individuals with type B characteristics did not see recycling as something to be concerned with on a local level but more on a global environmental basis. Others questioned the activity on economic grounds; however, the link between global to local activities was not established with this group.

Facilitating Conditions: This includes factors in the environment facilitating performance of the behaviour. Such factors include convenience, awareness of services and recycling process (knowledge), information and encouraging/discouraging factors, termed enablers and barriers respectively. For the individuals with type A characteristics, awareness was at a high level with knowledge of both the service and recycling process. In certain cases, this included a detailed appreciation of the disbenefits of landfill and the economics of recycling. Individuals with type B characteristics displayed a lower level of awareness supported by "don't know what happens to it" and no active thought into why materials should be recycled. Information was proactively sought using a variety of media by interviewees with type A characteristics, whereas interviewees with type B characteristics waited for the information to be provided or if they required something they would call the Council. Clearly interest in the topic and willingness to do more was evident for interviewees with type A characteristics. Enablers to recycling were mixed with nearly all interviewees from both groups suggesting recycling of mixed plastics and other materials not currently collected at kerbside.

Barriers to recycling for individuals with type A characteristics were based on quality of service provision and frequency of collection; however, poor quality of service and reduced collection frequencies would not stop them participating. For individuals with type B characteristics, poor service quality was a barrier to participation; however, the need for more pre-sorting by the householder would result in non-participation. Finally, although the direct question on convenience was not included in the interviews, this was evident from the responses to barriers and enablers. The observation was however subtle where no clear evidence in terms of difference was observed, other than a determination to continue despite service changes. This could support the participation in recycling only if it involves less effort for type B.

Habit: This component showed no variation in pattern between the interviewees based on the kerbside collection service. However, frequencies did increase for interviewees with type A characteristics for non-kerbside collected materials such as textiles and electrical equipment. One of the interviewees (Interviewee F) exhibited a deviation in their pattern of recycling from the other interviewees where preference was on reuse of items instead of recycling referenced by the quote “I repair everything” (Q18, No 322).

Claimed behaviour: This pertains to the statements relating to claimed behaviour from the PIQ and why each interviewee selected their response to the claimed behaviour question. For individuals with type A characteristics, a clear understanding of what can and cannot be accepted in the recycling scheme was stated as the reason for this selection, behaviour was also non-restrictive, showing no boundaries in terms of level of effort required. For individuals with type B characteristics, participation was linked to level of effort required, including checking labels, pre-sorting and recycling non-mainstream items such as plastic bags (which can be accepted at supermarkets). The above findings are summarised in Table 7.3, which

shows the determinant by TIB component in accordance with behavioural characteristics.

Table 7.3 Recycling determinants by TIB component and behavioural characteristics

TIB Component	Type A characteristics: Recycles everything they can. Not constrained by level of effort required and are not self-restricting in participating in recycling schemes	Type B characteristics: Recycles a lot but not everything. Participation determined by level of effort required. Displays elements of self-restriction in participation.
Cognitive attitude	Considers recycling very important with perceived consequences (Pc) of recycling featuring on improving the environment and personal benefits from reduction of waste. Evaluation of consequences (Ec) of recycling include achieving sustainability for future generations supported by a high level of interest in recycling.	Considers recycling fairly important with perceived consequences of recycling (Pc) aspirational in terms of assuming the environment is improved. Evaluation of consequences (Ec) not clear and expect some outcome from recycling but not sure why this was.
Affect	Very concerned over disposal of waste not recycled and local pollution. Express positive sense of duty and feel guilt when they fail to recycle items.	Fairly concerned over waste not recycled. Mixed feelings on recycling ranging from guilt to none at all, tend to blame market/Council for not providing services for recycling some items.
Social norms	Perceive high level of recycling takes place in community with established moral rules (prescriptive social norm) in operation regarding recycling	Perceive reasonable level of recycling is undertaken in the community. Social norm for recycling may be based on observation of what everyone else is doing (descriptive social norm).
Role	Strong community cohesion and believe they can influence community decision-making Links with prescriptive social norm.	Little community involvement and does not believe that they can influence community decision-making. Associated with a descriptive social norm.
Personal norm	Personal commitment to recycling with sense of pride and strong values	Sees recycling more of a routine or chore with no personal value attached to this
Self-identity	Personally concerned with local environmental quality and wider environment with recycling beneficial to improving the environment and community.	Sees recycling as beneficial to the environment but not sure how local activities contribute to improvement. No local to global connection.
Habit	Recycle as many materials as frequently as possible including those not collected via the kerbside service	Recycle on a regular basis but mostly for materials collected by the kerbside service
Facilitating conditions	See recycling as a convenient service. Barriers presented such as poor service quality and reduced collection frequency not a hindrance to participation. High level of knowledge on recycling process and awareness of services. Actively seeks information on how to recycle more items.	See recycling as a fairly convenient service. Barriers presented such as poor service quality and having to pre-sort materials a hindrance to participation. Moderate level of knowledge on recycling process and awareness of services provided. Does not actively seek to find out more on recycling services or how to recycle more materials. Prefers to wait for information to be provided.

7.8 Conclusion

Having undertaken analysis of responses from the household interviews and describing these in accordance with the TIB model components, as for the previous Chapter 6, the research objectives from Section 3.1.2 are now briefly re-considered from the qualitative analysis conducted on the household interviews:

For the first objective, this pertains to how behavioural preference impacts on the determinants of household waste recycling behaviour. There are clear differences between the interviewees in terms of their behavioural profiles which are characteristic of the framework of behavioural determinants labelled type A and B. In this regard, each interviewee identified with one or other set of characteristics.

For the second objective, this seeks to identify what are the key determinants in the TIB that influence household waste recycling behaviour. Broad conclusions were drawn from the analysis around different determinants which appeared important, particularly when compared with those determinants that influenced behaviour from the combined 'recycle everything' and 'recycle a lot but not everything' groups.

The third objective evaluates how the TIB may be used to show influence on household recycling behaviour for social and attitudinal components. This pertains to whether recycling behaviour is driven by social norms or attitudes. The differences between individuals with type A and B characteristics included for the former a clear focus on attitudes regarding improvements to the environment, personal benefits from recycling and positive sense of duty. This is associated with a personal norm and adherence to the prescriptive social norm in the community. In this regard, attitudes are the drivers of recycling behaviour for type A characteristics. Conversely, type B characteristics whose attitudes are less well formed and emotions are mixed may tend to behave in accordance with the behaviour of others in the community. In

other-words, the descriptive social norm is the driver of recycling behaviour for type B characteristics.

The fourth objective evaluates how the TIB may be used to show the influence on household recycling behaviour from intention to recycle and from recycling habit in terms of whether recycling behaviour is driven by habit or intention. Based on the characteristics of the individuals where recycling activity is a routine, habit is the driver of behaviour. All interviewees expressed routine in terms of kerbside recycling; however, those individuals with type A characteristics claimed to recycle beyond the kerbside more so than the type B counterparts and therefore recycling for Type A at bring sites and HRCs would be more of a routine. In this regard, recycling would be driven by habit if the activity is of a routine nature and by intention where processes are being learned and are not routine.

The fifth objective evaluates how the TIB may be used to show influence on household recycling behaviour from facilitating conditions in terms of the role facilitating conditions play in household recycling. For individuals with type A characteristics, higher levels of awareness of services, knowledge of recycling and evidence of a recycling being a routine activity suggest facilitating conditions play a supporting role to enable these individuals to recycle more materials. For individuals with type B characteristics, convenience of the service appears to be a driving factor in recycling due to the level of personal effort involved to recycle. Individuals with type B characteristics, who are more self-restricting in their behaviour, may be more likely to view convenience as a driver of intention instead of a direct influence on behaviour. If social norms are the main influencers to recycle as identified from question 4, then it is suggested that the role of the facilitating conditions convenience and information would be to reinforce the descriptive social norm.

Finally, with regard to the sixth objective this seeks to identify what are the key determinants in the TIB that inhibit household recycling behaviour. Individuals with type A characteristics were less likely to be inhibited in their recycling behaviour than their type B counterparts. It may be argued that inhibition of behaviour is associated with the opposite of promotion of behaviour. In this regard, non-provision of information, inconvenient and perceived poorly performing services would contribute to inhibition of recycling behaviour. The impact however on the behaviour depends on the personal characteristics of the individual, where type B would stop recycling due to increased level of effort required at which they may not be prepared to undertake. Individuals with type A characteristics are less affected by inhibiting factors and would be more likely to continue recycling due to the personal commitment and strong attitudes held.

The above analysis of household interviews provides an effective means to differentiate the characteristics of individual recycling behavioural determinants. The next stage involves the discussion of the findings from Chapters 4 to 7 and comparison with other behavioural models from previous research used for investigation into household recycling behaviour. It also seeks to confirm the suitability of the TIB as a model for investigation of household recycling and its contribution to research and suggestions for further work.

CHAPTER EIGHT: Discussion of findings of investigation of household recycling behaviour

8.1 Introduction to chapter

This chapter revisits the main research question and assesses the suitability of the Triandis (1977) Theory of Interpersonal Behaviour (TIB) as a model for the investigation of household recycling behaviour. It includes a discussion of the findings from the quantitative and qualitative data collection on a TIB component by component basis. This enables the TIB to be tested in terms of whether the findings support each respective TIB component as an influencing factor of household recycling. A comparison with other research from the literature review was also undertaken to identify congruency of the TIB components with the results from this research and other research findings. The research findings were then considered in terms of the secondary research questions from Section 3.1.2 and to assess the effectiveness of TIB in explaining household recycling behaviour. This is followed by the contribution to understanding from the research and concludes with suggestions for further work including alternative approaches in which the TIB could be used for investigating household recycling.

8.2 Revisiting the research question

The main research question is:

“What are the key determinants of household recycling behaviour and what degree of influence do these determinants have on the behaviour of individuals with regard to participation in household recycling schemes”

The sequence of activities for examination of the research question involved the following:

1. Selection of a behavioural model (TIB) for examination of household recycling behaviour
2. Collection and analysis of data on household recycling using a mixed-method quantitative and qualitative approach
3. Testing of the TIB in terms of its suitability for investigating household recycling behaviour
4. Identifying gaps in the research and suggestions for further research on household recycling behaviour using TIB.

8.3 Selection and scoping of study area and research approach

Previous work by independent researchers to examine behavioural determinants included sampling from a single population source area (Vining and Ebreo, 1990; Barr et al, 2001). The study area for this thesis needed to be manageable and therefore sampling on a national or regional basis, as undertaken by Government and academic institutions was considered impractical. In this regard, it was considered appropriate to select a sample population from within a local authority. The Royal Borough of Windsor and Maidenhead (RBWM) was selected as the study area for conducting this research due to the researcher (up to July 2009) being employed as the Council's senior officer responsible for Waste Management. This enabled the researcher to provide significant input into the design of Council surveys and to readily obtain access to Borough residents for conducting household interviews. A comparison with other local authorities and with national and regional performance suggested RBWM is not atypical in terms of household recycling. In

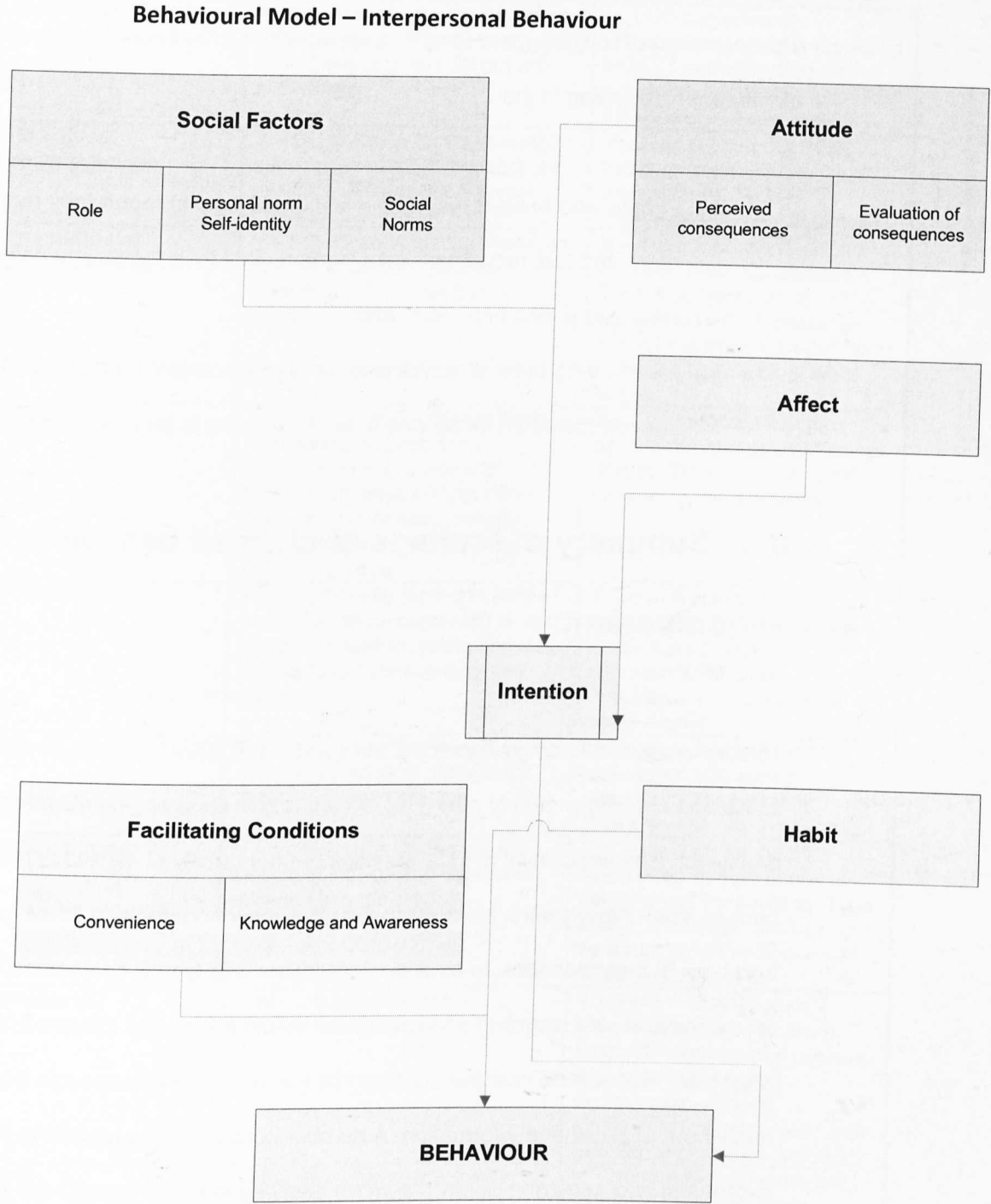
conducting the household interviews care was taken to ensure anonymity of the interviewees and to ensure the rights and freedoms of the interviewees were not compromised and the process was in compliance with Schedule 2 of the Data Protection Act (1998).

The literature research conducted in Chapter 2 included a review of behavioural models in addition to a review of previous research on recycling behaviour. A significant amount of previous research has been undertaken on recycling behaviour; however, the use of behavioural models to explain the interaction of behavioural determinants or 'antecedents' is relatively new in terms of the past 10 to 15 years. From the review, the Triandis (1977) Theory of Interpersonal Behaviour (TIB), which is reproduced again in Figure 8.1, was selected as a suitable model which incorporated a more comprehensive and diverse range of psycho-social components identified in the literature as being important compared to other models.

Another reason for the selection of the TIB is that it had not been previously used in a research setting for investigation of household recycling behaviour. In this regard, although its application to household recycling is novel, its established use in the examination of determinants for other areas of behaviour suggested that it would be useful for the investigation of household recycling. The summary of findings from the analysis of the secondary data and primary data collected from the Council survey and household interviews respectively on a TIB component basis are presented in the next section.

A comparison of claimed behaviour with actual behaviour was undertaken in Section 5.5 to identify over-reporting and to compare the results with previous studies involving similar comparisons. This was conducted through comparing claimed recycling participation in the kerbside collection service with the percentage of recyclables set out for collection via a participation survey

Figure 8.1 TIB Model for investigation of household recycling



The results, illustrated in Table 5.19 of Chapter 5, showed over-reporting of 8% for claimed over actual behaviour. Previous research into self-reported versus actual behaviour supports over reporting (RRF, 2002; Tucker 2003; Woollam, 2003) showed over reporting at over 15%. This suggests that respondents' claims on recycling behaviour in the RBWM survey were more representative of actual

recycling behaviour, than previous studies. Comparing behavioural patterns with previous research, McCarty and Shrum (2001) examined the importance and inconvenience of recycling and identified expectations of individuals regarding their beliefs about recycling in that:

- a) People who believe recycling is important tend to report they recycle more and that recycling is less inconvenient than those who believe recycling is less important, and;
- b) People who believe recycling is more inconvenient tend to report they recycle less than those who believe recycling is less inconvenient.

8.4 Summary of findings of claimed behaviour by TIB component

To summarise the findings from the 2006 survey and 2009 household interviews, facilitating conditions clearly play a significant role in encouraging recycling behaviour. The withdrawal of local services or poor quality of services presented barriers to all interviewees however these were insurmountable to those individuals with type B characteristics. In addition, individuals with type B characteristics tended to use the kerbside recycling service and were less aware and informed regarding what materials outside of those collected by the kerbside service could be recycled, and where to obtain the information. A number of key findings regarding individual determinants of recycling behaviour were identified from the quantitative and qualitative analysis of the secondary and primary data respectively. However in order to test TIB as a model for the investigation of household recycling, each TIB component was evaluated using both the qualitative and quantitative findings, (which are reviewed in full in Chapters 5 through 7) and are summarised below in Table 8.1:

Table 8.1 TIB component and evidence of influence on household recycling

TIB Component	2006 survey	2009 Household Interview
Behaviour	Y- from sample groups based on behavioural preference (recycle everything/recycle a lot but not everything)	Y- from behavioural characteristics profile based on level of self-restriction and effort required by the individual labelled type A and type B.
Perceived consequences	Y – Significance testing based on importance of recycling, showed statistical differences between groups.	Y –Type A characteristics focus on improving environment. Type B aspirational re consequences.
Evaluation of consequences	Y – Significance testing based on interest in recycling showed statistical differences between groups.	Y – Type A characteristics focus on personal benefits. Type B characteristics associated with expectation some beneficial outcome from recycling but not clear what this is.
Affect	Y- Significance testing for those very concerned and fairly concerned over disposal of rubbish not recycled and very concerned over local pollution showed statistical differences between groups.	Y – Type A characteristics associated with positive sense of duty. Type B characteristics showed mixed emotions.
Social norms	Y – Significance testing in terms of differences in perceived level of neighbourhood recycling showed statistical differences between groups.	Y- Type A characteristics associated with prescriptive social norms. Type B characteristics more associated with descriptive social norms.
Role	N – Significance testing did not show any statistical differences between sample groups	Y- Type A characteristics associated with strong community involvement. Type B less community involvement
Personal norm	N – Significance testing did not show any statistical differences between sample groups.	Y – Type A characteristics associated with personal commitment to recycling. Type B characteristics see recycling as a routine with no personal value attached to it.
Self-identity	I – Not identified as proxy question in survey	Y – Type A characteristics include recycling benefiting local environment and positive impact links on global environment. Type B characteristics associated with benefits to global environment
Habit	Y – Significance testing across all materials for regular recycling frequency showed statistical differences between groups.	Y – Type A recycle materials using kerbside and other sources. Type B recycle mostly kerbside collected materials
Facilitating conditions	Y – Significance testing for recycling convenience and awareness showed statistical differences between groups.	Y- Type A characteristics do not see inconvenience as a barrier to participation, also very knowledgeable on recycling and service. Type B characteristics sees barriers from inconvenience and less aware of services.

Where:

1. Evidence supports the TIB component as an influencing factor of household recycling = Y

2. Evidence does not support the TIB component as an influencing factor of household recycling = N

3. There is insufficient evidence to support either influence or non-influence in household recycling = I

8.5 Comparison of research with other research findings

The above findings were compared with previous research findings into household recycling. As previous research did not include the use of the TIB the behavioural components were selected from previous research to match the TIB components.

8.5.1 Cognitive attitude and affect

In terms of importance of recycling, McCarty and Shrum (1994) identified a *'trade-off'* between long-run societal gains and short-run individual needs and suggested an individual may feel recycling is important for the long-run good of society.

Conversely, in the short-run individuals may perceive recycling as inconvenient on a personal basis. This gave rise to suggestions of a mixture of positive and negative attitudes regarding socially conscious behaviours, which were influenced by an individual's personal values and value orientations. This phenomenon was observed from the household interviews where individuals with type B characteristics appeared not to be as considered and aspirational as individuals with type A characteristics, who recycled beyond the kerbside collection service. Thogerson (1994) suggested

that people who have a positive attitude toward recycling are likely to claim that attitude is overwhelmingly positive for people who recycle. However, this was not the case for those individuals who have less positive attitude toward recycling. In this regard Thøgersen (ibid) suggested that perceived belief in the benefits of recycling may be an automatic (non-cognitive) response and that the variation between individuals in terms of perceived consequences (Pc) of recycling may arise from non-cognitive attitudes. This concerns the impact of both cognitive and affective attitudes on behaviour.

Howenstine (1993) identified an indifference factor in recycling attitudes which includes "*never thought about it*" and that attitudes toward recycling in terms of beliefs were '*non-cognitive*' and more associated with automatic antecedents of behaviour. This may be reflected in the responses from the those individuals with type B characteristics who perceive something will happen but do not cognitively evaluate the consequences of recycling and may be indicative of indifference. Individuals with type A characteristics expressed a clear understanding of the perceived consequences of recycling and the evaluation of these consequences to envisage positive outcomes regarding improvement to the environment.

Verplanken et al (1998a) suggested that feelings predominate when beliefs and feelings toward an object were of opposite strength. This suggests that affect is the dominant factor in influencing an individual's attitude toward something when their cognitive attitude is different to their affective attitude. Davies et al (2002) argued that recycling attitude should be represented by an emotional component based on feelings and a cognitive component based on outcomes and consequences of the behaviour. This provides a useful comparison with the research findings for this thesis in terms of the cognitive process associated with type A characteristics from perceived consequences of recycling and the evaluation of these consequences and, the emotive responses and abstract evaluation of consequences associated

with type B characteristics. There were also statistically significant differences between the sample groups from the 2006 survey based on recycling preference for importance of recycling and interest in recycling representing outputs and outcomes, and concern over disposal of waste representing affect, thereby reinforcing the Davies et al (ibid) argument.

Research by Haddock and Zanna (2000) showed that the attitudes of individuals who expressed high cognitive activity (referred to as “thinkers”) were predicted by their beliefs about the attitude objects, but not by their feelings. However, the reverse was identified for lower cognitive activity individuals (referred to as “feelers”). In this regard, attitudes toward some objects or issues rely more on ‘*affect*’ than cognition and vice versa. Placing the above in the context of the current research the following statements from the household interviews are considered:

“Actually I don’t think at all about it”; “don’t see any benefits as a household”;
“Explain what happens ...what’s in it for me” (Interviewee H, Q 16, 5, 18).

Examining the above statements, the phrase “*don’t think*” appears to be contradictory to the challenge “*what’s in it for me*”? This suggests that the response is not associated with cognitive deliberation; however, the key descriptive phrase “*what’s in it for me*” infers a cognitive challenge to the process. With regard to the thinker/feeler concept proposed by Haddock and Zanna (ibid) for those individuals with type A characteristics who are inclined to cognitively challenge the wider aspects of recycling may be associated with ‘thinkers’. Conversely, those individuals with type B characteristics attitude is more driven by emotion before cognition may be associated with ‘feelers’. However, this linkage is theoretical as the research was not conducted along the lines as that by Haddock and Zanna.

It is difficult to draw strong conclusions based on a small number of interviewees, however, the observations suggest that attitude is formed based on a combination of cognitive and affective components and understanding of the consequences of an activity and the resultant outcome from this activity would logically require cognitive thought, whereas doing something without understanding and appreciation of the consequences would not. In this regard, individuals who exhibited type A characteristics also exhibited characteristics of 'thinkers' who can clearly explain why they recycle. However, individuals who exhibit type B characteristics are more associated with 'feelers' who are driven by emotion with little cognitive evaluation of the consequences of their action. Having said this, it is unlikely that the distinction between the two types of characteristics A and B regarding attitude preference is as clear cut as suggested. In this regard, there may be a mixture of cognitive thought and emotion from each respective type of individual and a future research area could involve whether this is observed from the recycle everything and recycle a lot but not everything sample groups.

8.5.2 Social norms

According to Schultz et al (1995), the use of social norms to encourage recycling behaviour was at the time a relatively new approach. Their research examined the impact of social influence on recycling behaviour including the use of peer support to establish community norms. Examples include Vining and Ebreo (1992), Oskamp et al, (1991) and Sadalla and Krull (1995) who found that influence from friends and neighbours led to higher recycling rates. Cialdini's (1990) distinction between social norms suggests two types which include a norm formed out of the visible behaviour of others (descriptive norm) and a norm formed from the socially shared rule of conduct regarding what other people think ought to be done (prescriptive norm).

Vermeir (2009), in her research into social pressure on recycling based on the level of self-monitoring, showed that attitude strength and social pressure were a major

factor in influencing behaviour from attitudes. She found that respondents who exhibited high (versus low) social pressure tended to act more positively on their *positive* recycling attitudes. Therefore respondents with strong attitudes engaged in recycling even in the absence of social pressure. Social pressure also influenced low-self monitors in which those individuals who were subjected to social pressure acted on their positive attitudes and recycled. The findings from Vermeir's (ibid) research suggested that strong attitudes were a good predictor of attitude-behavioural consistency regardless of the perception of control when the individual experienced high social pressure. Barr et al's (2003) research on kerbside recycling found that social norms were important where the visual indication of non-participation is much higher. Conversely, research by Tonglet et al (2003) on bring-site recycling speculated that social norms were not important in predicting recycling behaviour as there is little or no social cost to non-participants.

Findings from this research suggest that interviewees that demonstrated type A characteristics recycled everything they could and backed this claim with a moral foundation strongly supported within the community, reflecting the importance of recycling in their attitudes. Conversely, those individuals with type B characteristics perceived recycling as a normal activity in their neighbourhood, which may explain why their recycling behaviour was restricted towards the kerbside service. It is easier to observe and thus copy the actions of others from kerbside recycling than observing others taking materials to charity shops or using bring banks for recycling. In this regard, social norms may operate in a predominantly heuristic manner for type B characteristics, to influence recycling behaviour without requiring too much cognitive effort. However, for individuals with type A characteristics the social norm appears to operate directly on influencing social outcomes (improving the community and local environmental quality) associated with a given behaviour (recycling). Strong recyclers are associated with type A characteristics in which individuals hold personal values regarding recycling and concern for the environment and may be

influenced by the moral rules of the community where recycling is more than just a social activity. This may also explain why those individuals with type A characteristics actively seek out more ways to recycle, challenge the status quo and use more outlets to undertake recycling. Individuals with type B characteristics may be acting in accordance with the rules of sociality (Jackson, 2005) and are influenced by descriptive social norms observed from the behaviour of others, which may explain why no clear explanation was provided as to the perceived consequences and outcomes from recycling.

8.5.3 Role

Schultz et al (1995) suggested that rural residents may be more influenced by social norms than urban dwellers and that the same principle applies to homeowners over renters. They also proposed that successful use of social pressure to induce recycling may be largely contingent upon the extent to which residents see themselves as part of the community and the moral rules espoused within the community. Sadalla and Krull (1995) also identified an influence to recycle from family and friends.

The 2006 survey participants were selected to represent a cross-section of all RBWM Wards which include rural and urban areas. It was not possible to identify specifically which responses were from urban or rural areas only that they were from a particular Ward (includes mix of urban and rural). The household interviews conducted were predominantly in urban areas with only 1 semi-rural, for which role in the community was not a major factor for the individual. In this regard, comparing the research findings with that of the first part of the Schultz et al (ibid) suggestions, the information is inconclusive and there is no linkage to home ownership or location of the survey participants. This may be a future area for further research. For the second part of the Schultz et al (ibid) suggestions, those individuals that demonstrated type A characteristics demonstrated stronger links with the community

than those individuals with type B characteristics. Type A was also associated with recycling being considered a moral rule in the community, whereas type B was more associated with a neighbourhood activity without any moral guidelines. The findings of this research with regard to the level and reasons behind community involvement are supported by the findings from Schultz et al (ibid). However, with regard to the findings from Sadalla and Krull (ibid) an influence to recycle was identified from friends and neighbours for the behavioural preference groups, which showed statistical differences on significance testing.

8.5.4 Personal norms

In considering how personal norms shape this behaviour, a comparison with previous research includes that from Jackson et al (1993) who suggested that a person's voluntary recycling behaviour is largely determined by how important that person considers recycling to their own and/or society's well being. This was proposed as a result of conscious comparison of the benefits and costs (personal and societal) associated with recycling. The outcome was a reflection of the person's values and internalized norms of appropriate behaviour as identified by Schultz et al (1998). These findings suggest that because recycling is a socially desirable behaviour, the provision of information on an individual's personal recycling performance may activate personal norms. Jackson et al (1993) identified anecdotal evidence from participant responses with examples being *"You make me feel guilty for not participating"*. However, group feedback intervention which provided information on the recycling performance of their neighbours' was suggested to trigger not only personal but also the creation of a social norm. Jackson et al, (ibid) also found that personal norms were activated more readily than social norms as the intervention strategy was activating a personal recycling norm that already existed. Therefore the process of internalizing and acting on a new social norm may take longer than the activation of a personal norm. Vining and Ebreo (1992) suggested that the Schwartz model (1977) could be used to explain recycling behaviour as

being '*indirectly*' governed by social norms, and '*directly*' influenced by personal moral norms. Therefore those who feel morally obligated to recycle would do so if they believed that recycling had positive consequences (Awareness of Consequences, AC) and whether they felt personally responsible for those consequences (Ascription of Responsibility, AR).

From the qualitative data analysis, individuals with type A characteristics expressed strong personal values toward recycling and supported their views with how they perceived the consequences of recycling resulted in improved environmental outcomes. In addition, individuals with type A characteristics did not appear to change their personal responsibility when others were not observed recycling in the neighbourhood. This is contrary to Weyant's (1986) findings in which personal responsibility was reduced when others were not seen to be recycling. Jackson et al (1993) linked individual recycling behaviour to level of importance and contribution to the well-being of society. Individuals with type B characteristics did not envisage a link to the benefit of the community and may not make the conscious comparison of personal and social costs.

The TIB model appears to provide a link between personal and social norms and attitudes in terms of perceived consequences, evaluation of consequences. This is illustrated from the perceived personal benefits to the environment, the evaluation of these benefits and how this benefits the local environment and the community. In this regard, the type A characteristic would fit the Schwartz (1977) model; however, other interacting determinants within the model may influence behaviour as well as personal norms.

8.5.5 Self-identity

The Terry et al (1999) study into recycling intention identified self-identity²⁵ as a continually distinctive predictor of intention to recycle. Stryker (1986) and Stryker and Burke (2000) proposed individuals have distinct components of self for each of the role positions occupied and concluded that the self is a collection of identities that reflect the roles that a person occupies in the social structure. Tajfel and Turner (1979) suggested the self-concept was derived from memberships in social groups and categories, which provided a continuum between personal and social identity where shifts along the continuum determined the extent to which group related or personal characteristics influence an individual's feelings and actions. Therefore if the behaviour and feelings are in accord with the norms of a behaviourally relevant group then they are likely to engage in a particular behaviour (Terry and Hogg, 1996; Terry et al, 1999). Conversely, if the group membership is not salient then the associated behaviour would be in accordance with their personal and idiosyncratic characteristics rather than the group norms.

There is a similarity in the findings from the household interviews and that from work undertaken by Tajfel and Turner (1986) and Terry et al (1999) in that self-identity appears to be generated from social influence from significant others or groups that are important to a particular individual. This may either be through knowledge or individuals and helps in forming the individual's self-perception regarding local environmental quality and global environmental issues. Therefore individuals with type A characteristics who regard recycling as an important component of their self-identity would be more likely to participate in recycling schemes than individuals with type B characteristics who did not connect recycling benefits to the local community. The behaviour of people with Type A characteristics is therefore likely to be in accord with the norms of the community, however if the membership of the social group is

25 The extent to which performing a behaviour is an important component of the persons self-concept (from Eagly and Chaiken, 1993)

not salient to the individual then from Manetti et al (2004) their behaviour may be in accordance with their personal characteristics.

8.5.6 Habit

Landis et al (1978) and Triandis (1980) suggested that when intentions become important the habit component is suppressed. Conversely as a particular behaviour repeatedly occurs, the importance of the habit component increases, while the behavioural intention component decreases. Further research by Knussen and Yule (2008) suggested that a lack of recycling habit could actually be an indication of an alternative habit in which recyclables were disposed in the residual stream. They also identified that those who recycled most of their waste in the past were more consistent with attitude than would be expected if the behaviour was habitual. In this regard, it was the 'non-recyclers' who were displaying habitual behaviour.

Verplanken et al (1998a) further suggested that behaviours such as recycling involve more than one action (bottle washing, storage, set out), and that difficulty in measurement is compounded where more than one step of action is required. This was supported by Knussen and Yule (ibid) who suggested that consideration of each respective step associated with recycling as an individual habit would be more appropriate.

The 2006 survey and 2009 interviews from this research thesis examined habit in terms of frequency and the reasons behind the habit were not specifically explored. However, with regard to comparing the findings with Verplanken et al (1998a), some of the individuals who demonstrated type B characteristics stated 'habit' as a reason for recycling, whereas most of the individuals with type A characteristics cited personal values as a reason for recycling. In this regard, type B may have been expressing automatic behaviour as identified by Cacioppo and Petty (1982) and Verplanken and Van Knippenberg (1998a).

To provide an explanation for the above observation, this may be related to the degree of 'procedural rationality' where one individual's behaviour is under control of habit (or H factor) and another is under the control of intention (or I factor) according to Triandis (1977). For the individuals who demonstrate type A characteristics, recycling may be regarded as a personal norm; however, frequent recycling of materials using the kerbside service is associated with both type A and B characteristics. Individuals with type A characteristics also tend to take recyclable items to bring sites, which is less frequent for individuals with type B characteristics. It is suggested that kerbside recycling by both individuals with type A and B characteristics is a routine and over-learned. Individuals with type A characteristics may attach a personal value to recycling and exhibit less self-restriction in their recycling behaviour, whereas individuals who demonstrate type B characteristics do not appear to attach a personal value and exhibit more self-restriction in their efforts to recycle. This may explain why individuals with type B characteristics cite recycling as a habit as it is based on kerbside recycling, which requires less effort than bring site recycling.

With regard to the impact of facilitating conditions on intention, for individuals with type A characteristics the activity of taking recyclables to the bring site may be associated with a greater degree of procedural rationality than individuals with type B characteristics. In other words, the activity becomes a routine which is under H control and may be reinforced with personal values. The level of effort required and potential disruption in taking recyclables to the bring site for individuals with type B characteristics is associated with a lesser degree of procedural rationality and is more under the control of intention (I control). This may be further affected by the degree of inconvenience and level of knowledge regarding location of bring site, materials accepted etc. which represents the moderating influence from facilitating conditions.

8.5.7 Facilitating Conditions

Vining and Ebreo (1990) found that recyclers were better informed overall about recycling than non-recyclers. Knowledge about locally recyclable materials was more accurate with recyclers as well as familiarity with local programmes and sources of information than non-recyclers (Vining and Ebreo, 1990; Hansmann et al, 2006). Their findings also identified that '*cognitive dissonance*' (Festinger, 1957) prevented non-recyclers from seeking out information and recalling it. They proposed that if the information was congruent with their beliefs but not their behaviour, then a cognitive decision needed to be made to either change their behaviour or to ignore the information provided.

Oskamp et al (1991) also suggested the amount of recycling behaviour may be less related to knowledge regarding environmental (global) problems in general than to local knowledge of the specifics of recycling. De Young (1989) claimed that reasons "*why*" may be no longer as important as knowing "*how*" and "*where*". Research by Howenstine (1993) on recyclers and non-recyclers identified three major factors to non-recycling which included '*indifference*', '*location*' and '*household nuisance*', where the former two factors relate to the '*belief-behaviour incongruence*' phenomena (Vining and Ebreo, 1990), and the latter factor to convenience.

Comparing the findings of this research with the above, although individuals who demonstrated type B characteristics are not non-recyclers they may exhibit some of the factors from Howenstine's (ibid) and Vining and Ebreo (ibid) research. This is with regard to non-seeking of information on recycling or '*indifference*' to information, perceived inconvenience from pre-sorting of recyclables and effort involved in travelling to bring sites. Furthermore individuals with type A characteristics were more knowledgeable on recycling processes, aware of how services work and locations of facilities and actively sought information on how to recycle more materials. In addition, from the 2006 survey convenience was identified as a major

influencing determinant of recycling behaviour. Convenience and knowledge also showed significant differences between the two groups based on recycling preference. These findings are suggested to be supported by the findings from Vining and Ebreo (ibid) and De Young (ibid) and Oskamp (ibid).

With regard to the impact on behaviour from cognitive dissonance, the reasons why information was not actively sought was not explored; however, one of the interviewees chose not to recycle as they preferred to reuse of items. It may be argued that this individual chose to ignore information on recycling as this activity was incongruent with their beliefs regarding reuse items. Perrin and Barton (2001) identified inconvenience as a major barrier to recycling, and convenience a major motivator for recyclers. This was based on their findings from the introduction of a kerbside scheme into an area which increased the proportion of households claiming to recycle. They also identified that the type of service introduced not only increased participation but also how efficiently households used the scheme. This suggests service quality and design are key facilitating conditions of recycling behaviour.

With regard to service provision, Thomas et al (2004,) in their evaluation of attitudes and behaviour in the Western Riverside area, identified that low/non-recyclers cited lack of provision, confusion of services and how to use them. Furthermore, medium to high recyclers stated that consistency between schemes and standardisation of services across Councils, were more important issues for ease of use of recycling facilities. This latter observation may support the findings from those individuals with type A characteristics who suggested improvements to the recycling service beyond personal requirements.

Finally from a combined infrastructure, service behaviour (ISB) perspective Timlett and Williams (2011) identified this model as a practical and realistic means to consider the internal and external factors that influence pro-environmental practices.

Applying the principles of ISB to the type A and B characteristics it is likely that the former's recycling performance would be unlikely to change as poor service provision and infrastructure would not provide a restriction in behaviour and knowledge/awareness of services is self-driven by individuals with these characteristics. However the ISB model would be useful when applied to individuals with type B characteristics due to the self-restricting nature of these individuals.

8.5.8 Summary of findings and comparison with previous research

Table 8.2 compares the findings from this research with that of the literature reviewed in previous research from Chapter 2 in terms of the respective TIB component, where available.

Table 8.2 Summary of comparison of research findings with that from literature review

TIB Component	Previous research (literature review)	Current research (this thesis)
Perceived consequences	Davies et al (2002) identified recycling attitudes as two separate components with regard to feelings and knowledge and outcomes	Pc and Ec considered separately with linkage to affect not considered. However differences observed between recycling preference groups and from type A and B characteristics regarding Pc and Ec.
Evaluation of consequences	Other research suggests Pc and Ec as continuum with affect in which individuals whose behaviour is driven by cognitive attitude are termed 'thinkers' and those driven by emotion 'feelers' (Haddock and Zanna, 2000).	Findings may place individuals who envisage clear picture of consequences (type A characteristics) as thinkers.
Affect	Combined as continuum with Pc and Ec.	Affect investigated separately in research. However findings may place individuals with type B characteristics who are less clear on consequences (Pc and Ec) but have mixed feelings..
Social norms	Social pressure and influence on recycling	Type of social norm from qualitative data is suggested to be dependent

	(Vermeir, 2009) varies depending on visibility of participation by individuals. Little social influence from bring site (less visible) and greater social influence from kerbside (more visible) in accordance with Tonglet et al, 2006 and Barr et al, 2003 respectively.	on characteristics of individual (type A prescriptive/type B descriptive) Perceived level of recycling from quantitative analysis in neighbourhood varies with level of recycling. However quantitative data measured different aspects of social norms than previous research.
Role	Research for 'role' component in literature review focussed on social influence and community involvement (Schultz et al, 1995). Also from Social diffusion (Sadalla and Krull, 1995) regarding influence from family and friends.	Type A strong community involvement and espouse prescriptive norm. Type B characteristics less community involvement and descriptive norm based observing others recycling in the neighbourhood. Recycling preference does not appear to affect involvement in community decision-making for quantitative analysis. Quantitative data also identified influence identified from friends and neighbours in recycling.
Personal norm	Literature review findings from values and internalised norms (Schultz et al, 1998). Links to recycling behaviour direct influence from personal norm and indirect influence from social norm (Vining and Ebreo, 1992).	Qualitative findings identified strong personal responsibility for type A characteristics. Quantitative findings examined differences between recycling preference and level of guilt for not recycling, which was inconclusive.
Self-identity	Research by Terry et al (1999) identified a link with role and Tajfel and Turner (1979) identified continuum between personal and social identity.	Qualitative findings only identified difference between individuals based on whether recycling is important to self-identity (personal identity) and benefits to local community (social identity). This compares to findings from literature review.
Habit	Research by Triandis (1980) focussed on degree of procedural rationality and importance of intention with facilitating conditions a moderator of behaviour. Findings of others (Knussen and Yule, 2008) focussed on sequence of activities.	Habit examined in terms of frequency and types of materials for quantitative data and frequency/facilities used for qualitative data. Links with facilitating conditions may draw comparison with Triandis (1980) findings.
Facilitating Conditions	Literature focussed on knowledge of services (Vining and Ebreo, 1990), service convenience (Perrin and Barton, 2001) and service quality (Thomas et al, 2004) and combined ISB (Timlett and Williams, 2011) influence.	Quantitative data identified convenience as main influence of recycling behaviour. Qualitative findings identified differences between type A and B characteristics regarding barriers to participation, level of awareness of services and use of information.

The findings from previous research covered in the literature review for the components used in the TIB model provide evidence of influence on recycling behaviour. The literature review also supports the findings from this research in particular for social norms, facilitating conditions, habit, self-identity, and role. Cognitive attitude (represented by P_c and E_c) showed similarities to the literature supporting the suggestions by Davies et al (2002) and identified areas for further research.

The data from the 2009 household interviews however were obtained from a small sample of individuals, which in isolation are not sufficient to claim with any degree of certainty whether the behavioural patterns may be applied beyond the sample group of interviewees to a wider area. However the quantitative data shows differences in recycling behaviour preference for most of the TIB components.

8.6 Consideration of the TIB as a model to investigate household recycling

The next stage involves considering how the components fit together in the TIB model and whether this has further value in understanding the determinants of recycling behaviour and how this addresses the research questions as set out in Chapter 3 (3.1.1). This provides an illustration of the TIB regarding how the components link to each other.

8.6.1 Overview of the TIB model in terms of research findings

A key element of behaviour which is largely absent from many behavioural models is habit. According to Triandis (1980) there is a central relationship between habit,

behaviour and behavioural intention which is reflected in two relationships. The first relationship is based on the probability of an act's occurrence (P_a) being the sum of the habits (H) plus behavioural intention (I) multiplied by the facilitating conditions (F) and stimulation (P). Therefore, the greater the individual's ability to perform the behaviour, the greater the H factor in which behaviour is driven by procedural rationality (H control). Conversely for new activities, control of behaviour is under intention. This provides a powerful means of linking intentions formed from attitudes and social factors and moderated by facilitating conditions with habit. The second relationship according to Triandis is the role played by social factors and emotions in forming intention. This was based on behavioural intention being a function of social factors (S) the affect (A) toward the behaviour and the evaluation (E_c) of the perceived consequences (P_c) of the behaviour. The S factor reflects the individual's internalisation of the subjective culture of the reference group, which internalises the individual's perception of the social group. Subjective culture involves roles, norms and values that form the social factors that influence an individual's intention. This differs from the first relationship which was based on stimulation and has minor cognitive aspects whereas the second relationship is mostly cognitive-evaluative.

Applying the above theory of Triandis (*ibid*), household recycling behaviour may be seen as having external consequences e.g. on the environment from which these consequences are interpreted internally by the individual. As a result of this, the interpretations result in reinforcement to the individual. This changes the perceived probability that behaviour will have particular consequences and changes the value of the consequences and hence the perceived outcome from household recycling. This is observed from the variation in response between individuals who demonstrate type A or type B characteristics and from the statistical differences between the recycling preference groups on importance and interest in recycling and level of concern on disposal of waste. This describes the role of attitude, its probability and its role as a determinant of behavioural intention (which is also a

determinant of behaviour). This provides one aspect of intention, with the other components being associated with social norms, role, self-identity and personal norms.

According to Triandis (ibid) an individual's personality is formed from previous situation-behaviour reinforcement sequences. This process internalises an individual's way of perceiving their social environment. Other determinants of behaviour include habit and (according to Triandis) arousal, but together they cannot result in a behaviour if the situation makes behaviour impossible. The role of facilitating conditions therefore becomes important as a moderator of behaviour. Facilitating conditions identified from the research include convenience of service, knowledge and information in which differences in the influence of these components on recycling behaviour were observed for interviewees with type A and type B characteristics. Differences were also observed in the findings from the quantitative survey between the behavioural preference groups for convenience and knowledge, thereby adding weight to the importance of the facilitating condition component. Previous experience may also impact on the perceived consequences as a result of previous encounters with a poor quality recycling service resulting in pre-conceived opinions and self-fulfilling prophecies regarding household recycling.

According to Triandis (ibid) behaviour may also influence the facilitating conditions and awareness or arousal of the individual, while triggering social factors at various levels. This includes the degree to which the individual subscribes to the social norm (prescriptive/descriptive), their role within the community and how their self-identity interrelates with this social environment. In terms of the research findings, the type of social norm varied between individuals with type A characteristics being associated with prescriptive social norms and individuals with type B characteristics associated with descriptive social norms. Depending upon the values of the individual regarding household recycling, this may dictate how attitudinal and social influences form a

personal norm which bridges the social and the cognitive-affective components of behavioural intention.

8.6.2 Research aims and objectives

The findings from this thesis are now considered in terms of how they address the research objectives and aims of the research.

Objective 1: To evaluate how preference influences the determinants of household waste recycling behaviour.

Quantitative analysis of the data for each proxy question using significance testing showed some statistically significant differences between the sample groups for most of the TIB components. This was observed where a positive response was provided e.g. 'recycling is important' and 'recycling is very important'. However, there were few differences observed based on the proportion of negative type responses e.g. recycling not important. This suggests that recycling behaviour varies in most cases where the influence from the behavioural determinant is positive, but much less where there is a negative influence. Therefore, the inference from the quantitative analysis of the 2006 survey data is that there is a difference in the determinants of recycling behaviour between the sample groups but this difference is non-directional.

Analysis of the qualitative data from the responses obtained from the household interviews suggested that there were differences between the interviewees. These differences were associated with the degree of self-restriction in recycling scheme participation and effort involved to recycle, providing a behavioural profile. These behavioural profiles were characteristic of the framework of behavioural determinants in which each interviewee identified with one or other set of characteristics labelled type A and type B.

Objective 2: To identify the key determinants using the TIB that influence household waste recycling behaviour.

In terms of quantitative data the questions from the the 2006 claimed behaviour survey were used as proxies to represent the TIB components. An exception to this was for the component 'self-identity' for which none of the survey questions were considered a suitable proxy to represent this component. Questions for the household interviews however were based on the TIB and were developed using questions based on the TIB components from other applications. The quantitative data in terms of the percentage of responses for each sample group (recycle everything/recycle a lot but not everything) was mapped onto the TIB model in order to illustrate the TIB components (with the exception of self-identity) in terms of household recycling behaviour determinants. The responses from the interviewees were used as pen portraits to illustrate the determinants of household recycling behaviour for all of the TIB components. This objective was partly addressed from the literature review and through use of the TIB to represent behaviour in both qualitative and quantitative forms. The literature review identified several behavioural determinants for which most of these were suggested to be associated with household recycling. These determinants were also identified and represented in the TIB model.

Analysis of the quantitative data using regression analysis identified the combined influence of the TIB components on recycling behaviour. The findings from this analysis suggested that convenience of recycling and recycling of glass and plastic bottles were the main influencers. With regard to analysis of the qualitative data, broad conclusions around different determinants which appeared important, between the 'recycle everything' and 'recycle a lot but not everything' groups were drawn.

Objective 3: To evaluate how the social and attitude components in the TIB influence household waste recycling behaviour.

The quantitative analysis of the 2006 survey data for the attitude components perceived consequences (Pc), evaluation of consequences (Ec) and affect showed a difference between the two sample groups. These components were represented by the proxies level of importance of recycling, interest in recycling and concern over disposal of waste respectively. Social norms based on the proxy perceived level of recycling in the neighbourhood also showed differences between the two sample groups. These differences were non-directional meaning it was not possible to identify from the data whether people who recycle a lot but not everything place greater or less emphasis on attitudes or social norms to recycle than people who recycle everything they can.

With regard to the qualitative analysis of the household interview data in terms of attitude, differences were observed between individuals with type A characteristics and type B characteristics for Pc, Ec and affect. This included a clear focus on improvements to the environment, personal and community benefits and a positive sense of duty for type A. Conversely, type B attitudes were less focussed, aspirational and showed mixed emotions. For social norms, individuals with type A characteristics were associated with a prescriptive norm and active community involvement. For individuals with type B characteristics the social norm in operation was descriptive

Comparing the findings with the literature review influence from social norms and other socially related factors such as role depends on the type of social norm operating in the community and the degree of influence this has on the individual. Descriptive norms may be an example of sociality (Jackson, 2005) and copying of others behaviour and may be associated with type B characteristics. Prescriptive norms represent the moral rules of the community associated with type A characteristics. Subscription to a particular norm is dependent on the level of effort

and commitment the individual is prepared to accept. In this regard, individuals who demonstrate type A characteristics may be associated with subscribing to a moral commitment and are strongly driven by personal norms, whereas individuals with type B characteristics may be more influenced by heuristics and what others are doing.

Individuals with type A characteristics provided a clear understanding of the consequences of recycling and the evaluation of these consequences in terms of benefits to the community and environment. These individuals may be associated with the 'thinkers' identified from Haddock and Zanna (2000) whose perceived consequences and evaluation of the consequences or cognitive attitudes, regarding an issue operate based firstly on cognitive then affective responses respectively. Strong cognitive attitudes have links with personal norms and self-identity and are from the research findings more associated with type A characteristics than type B. As personal norms provide a bridge to social factors recycling behaviour is suggested to be more directly influenced by personal norms and indirectly governed by social norms for individuals with type A characteristics. In this regard, the strong cognitive attitudes in accordance with the thinker concept which translate into personal norms may result in a greater personal awareness of the consequences of recycling. However, for individuals with type B characteristics, influence would be more associated with emotion and observation of the behaviour of others who are recycling in the neighbourhood.

Taking the findings from the household interviews and comparing these with that from the 2006 survey responses, it is suggested that influence on recycling behaviour is dependent on the characteristics of the individual. In this regard, for individuals who demonstrate type A characteristics, their recycling behaviour would be more influenced by cognitive attitude, which shapes personal norm formation and as a consequence the social norm adopted by the individual. The feelings

experienced by these individuals are more likely to reflect their personal commitment than an emotive response. In addition, individuals who are influenced by cognitive attitude are likely to be more interested in recycling and view recycling as an important activity, which are strong cognitive processes. These individuals are also likely to be very concerned when materials are not recycled reflecting the personal commitment. Conversely, for those individuals who demonstrate type B characteristics, their recycling behaviour which is less cognitive driven, is likely to be more influenced by observation of others behaviour before formation of a response toward recycling. These individuals may be less interested in recycling but feel recycling is important as the influence is driven through emotion.

Objective 4: To evaluate how intention to recycle and habit influence household waste recycling behaviour.

Quantitative analysis of the 2006 survey data identified differences between the sample groups for habit based on frequency of recycling paper, card, plastic bottles, cans and glass and recycling of garden waste. Differences were also identified for the components making up intention, which included attitudes, norms and role with the latter component being associated with influence from family and friends as opposed to influence in community decision-making. However, as for the previous question the differences were non-directional.

With regard to the qualitative analysis, individuals who demonstrate type A characteristics are likely to undertake recycling activities including pre-sorting and taking items to recycling facilities on a routine basis. Individuals who demonstrate type B characteristics are less likely to recycle items beyond the kerbside collection service due to self-restriction and perceived level of effort involved. In this regard household recycling behaviour for individuals with type A characteristics is more likely to be under habitual (H) control due to a greater degree of procedural rationality. However, for individuals with type B characteristics, recycling beyond

habitual behaviours such as use of the kerbside service is likely to be driven by intention (I) control in which facilitating conditions such as convenience, knowledge and awareness play a moderating role in influencing their behaviour.

The literature review identified differences in influence on behaviour in accordance with the degree of procedural rationality (Triandis, 1980). The above findings provide a means of attaching personal characteristics to Triandis (ibid) theory when applied to recycling behaviour. Comparing the household interview findings with the 2006 survey data, it is suggested that behaviour which is driven more through habit than intention is likely to be associated with individuals who recycle everything they can on a regular basis. This involves recycling of materials beyond the kerbside recycling service as for those individuals who recycle a lot but not everything and those who recycle everything, kerbside recycling is more likely to be habitual. Individuals who recycle regularly beyond the kerbside are more likely to develop a routine than those who do not.

There will however be a situation in which a new recycling initiative (e.g. a subscribed garden waste scheme) is introduced which will initially not be a routine for all individuals regardless of behavioural characteristics. In this regard, and depending on the characteristics of the individual, the decision to participate in the new scheme will be via cognitive or normative routes. Both individuals behaviour at the beginning of the scheme will be driven by intention as the social and moral benefits are considered under the control of intention.

Based on the qualitative and quantitative analysis of data, it is suggested that recycling is driven by habit when the activity becomes a routine. This is not necessarily related to behavioural characteristics as both types of individuals regardless of claimed behaviour exhibit habitual behaviour.

Objective 5: To evaluate how facilitating conditions influence household waste recycling behaviour and behavioural intention.

According to Triandis (1980), facilitating conditions are suggested to play a moderating role in influencing behaviour. Facilitating conditions provide a means for an individual to undertake behaviour such as household recycling using both kerbside and other facilities, so that the behaviour eventually becomes automatic and is under control of the habit (H) factor.

The quantitative analysis of the survey data identified differences in convenience and awareness, which are both facilitating conditions. However, the findings were non-directional. For the qualitative analysis, individuals with type A characteristics where behaviour for recycling is likely to be a routine activity a change in social norms in the neighbourhood or barriers to participation is unlikely to impact on the routine of the individual, unless the barriers are significant. For individuals associated with type B characteristics, the level of effort required to recycle may be enhanced through provision of information, improved convenience and increased awareness of the individual. This behaviour associated with individuals demonstrating type B characteristics may also be overridden from influence in the neighbourhood and the descriptive social norm in operation. In this regard, for type B characteristics facilitating conditions may moderate an individual's behaviour through changes in behavioural intention affecting attitude. However, change in behavioural intention in accordance with question 4 may also be influenced from the descriptive social norm. For type A characteristics, facilitating conditions may be more associated with direct moderation of behaviour where control of behaviour is under habit and intention is less likely to be impacted from facilitating conditions unless their routine is affected.

Comparing with the findings from the quantitative analysis, individuals with a greater awareness of recycling services and knowledge of recycling are more likely to recycle everything they can because they know how to and where. Recycling

behaviour for these individuals becomes a routine and less affected by changes in social norm and therefore intention. Conversely, individuals who recycle a lot but not everything, for those activities outside of their regular routine facilitating conditions such as level of convenience are likely to influence their intention to recycle and this behaviour.

Objective 6: To identify the key determinants using the TIB that inhibit household waste recycling behaviour.

It may be argued that the main factors which inhibit household recycling are the removal of those factors which influence household recycling for certain individuals such as those who exhibit type B characteristics. This is the corollary of question 3 "what are the key determinants of recycling behaviour", which were identified from the quantitative analysis of the 2006 survey as convenience and recycling of glass and plastic bottles. Therefore inconvenience of a service and removal of recyclable materials which are popular with individuals may present an inhibiting influence to an individual.

For the qualitative findings, an example of inhibiting factors may be drawn based on characteristics of the individual from the following scenario involving removal of cardboard from the garden waste collection service due to changes in quality of composting standards. Individuals with strong positive attitudes and personal norms regarding recycling may simply take their cardboard to an HRC or bring site for recycling. Repetition of this activity would then develop into a routine in which habit becomes the driving influence in recycling behaviour. It is suggested that individuals who demonstrate type A characteristics would be likely to follow this path.

Conversely, individuals who are associated with type B characteristics may not take their cardboard to the HRC/bring site and could be either driven by their emotions, which include anger at changing the service or observation of others recycling

behaviour (place in bin or take to HRC) in their neighbourhood before taking action. In this regard, individuals with type B characteristics may place cardboard in the residual bin or if their neighbours are taking the material to the HRC/bring site they may follow suit. This also provides an example of infrastructure and service impacting on behaviour in which individuals with type B characteristics are more subjective to influence from:

- ◆ S changes in service (removal of kerbside collection of cardboard) and;
- ◆ I the infrastructure used in the replacement solution (collection of cardboard through bring sites/HRCs)

The situation may be alleviated for individuals with type B characteristics through provision of information as to locations of bring sites accepting cardboard to improve awareness, addressing the B factor from the ISB model (Timlett and Williams, 2011) . Also seeking ways to make recycling of cardboard more convenient such as adding to the commingled recycling bin (if provided) or accepting certain types such as light cardboard in with paper recycling. Bringing in the quantitative survey findings to address the above scenario, both individuals who recycle everything and who recycle a lot but not everything have had their routine disrupted. The practice of disposing of cardboard with garden waste is no longer under habitual control and a new routine would need to be learned. Those individuals who recycle everything, which includes regular use of the bring sites are likely to more easily develop a new routine involving taking cardboard to HRCs and bring sites. Conversely individuals who recycle a lot but not everything may be less familiar with recycling beyond the kerbside service and may opt to place cardboard in the residual bin. These individuals may be more influenced by social norms than the consequence of cardboard going to landfill and if the descriptive norm is to place it in the residual bin then they may copy the behaviour of others.

Aims of the research

The aims of the research - To evaluate the TIB as a model for investigation and analysis of household waste recycling behaviour are now considered in the next section. The use of the TIB for investigation of household recycling behaviour may be a novel application compared to its previous uses. The findings from this research suggest that the TIB provides an equally if not better means to examine the key determinants of recycling as that provided by other multi-attribute models and their expanded versions. Putting this last comment into context, previous investigations into recycling behaviour have used expanded versions of other behavioural models with examples being the TRA (Barr et al, 2001) and the TPB (Tonglet et al, 2003). Bagozzi (1992) suggested that extended versions of the TRA and TPB may be able to accommodate wider realms of social behaviour, however he caveated this statement with the risk of loss of parsimony of the model and that the structure may increase haphazardly.

The TRA and TPB have been commonly used in expanded forms for investigation of household recycling, however in comparison with the TIB there are still components which are relevant to recycling behaviour such as habit and self-identity which are not included in these models. The TIB contains a similar front-end structure to the TRA/TPB in that P_c and E_c and norms are included as components of intention, however the norms are subjective, affect is not present and there is no role or self-identity this research has found to be important determinants of household recycling. The TIB demonstrates that not all behaviours are under conscious control and that the performance of behaviour depends on the combined influence of intention and habit. Furthermore, it was identified from the research that a number of facilitating conditions moderate the intention-behaviour and in certain cases the habit-behaviour relationship. In this regard, the explanation of behaviour using the TIB may be explained using three components intention, habit and facilitating conditions, where the probability to perform a particular behaviour according to Triandis (1980) is

defined by the combined influence of habit and intention in which each is weighted by facilitating conditions.

An added dimension is the applicability of this relationship to the disposition or characteristics of the individual, which in the case of this research identified two sets of characteristics, A and B, based on the degree of self-restriction and level of effort to recycle.

8.6.3 Contribution to understanding

Use of the TIB provided a means for comparing interpersonal behaviour, even if the subject matter is significantly different e.g. telemedicine and household recycling. This is due to the application of the concepts using TIB as a model without the need to focus on subject matter. In this the adoption by physicians of telemedicine (Gagnon et al 2003; 2006) was investigated based on the triage relationship of Habit, Intention and Facilitating Conditions, which may be compared using the same approach for household recycling. This relationship which is not associated with the TRA, TPB, Schwartz model etc., allows an initial stage assessment of behaviour before conducting detailed analysis of the components of intention and may be a suitable approach to future studies using the TIB.

CHAPTER NINE: Conclusion and recommendations

9.1 Introduction to Chapter

This final chapter covers the salient conclusions from the preceding three data chapters and discussion chapter, and recommendations for further work arising out of the research. The review of the findings includes an examination of policy recommendations for RBWM and similar types of Councils in the South East of England.

9.2 Salient conclusions from research

The main outcome from this research is that the TIB model provided an effective means to examine and understand the determinants of household waste recycling behaviour. The research question was divided into key aims and objectives, in order to refine the issues under investigation in accordance with the literature on household recycling behaviour. This also enabled testing of the TIB to determine its suitability. The mixed method approach provided breadth and depth of understanding of behavioural phenomena using combined quantitative and qualitative research approaches within the study area RBWM.

In terms of the key findings, chapter 5 identified a general trend of positive interest, importance, active concern, and perceived high levels of neighbourhood recycling. Chapter 6 showed that there were differences in behavioural determinants between individuals, based on recycling preference, which were statistically significant. The qualitative findings from Chapter 7 complemented the observations from Chapter 6, where two distinct types of characteristics A and B, were identified from the research in which the drivers of recycling behaviour were fundamentally different between individuals.

What has emerged from the research is that recycling behaviour of individuals appears to be driven by level of self-restriction on participation in household recycling schemes and personal effort by the individual. Determinants of behaviour for each behavioural type differed in their degree of influence and in the case of social norms, type A characteristics were associated with prescriptive norms and type B characteristics were associated with descriptive norms. For some determinants such as attitude, each behavioural type was associated with influence on behaviour being driven by emotion (affect) or cognition. Other factors such as role and self-identity were not so much as absent but more predominant in the case of influence on recycling behaviour and linked to other social factors. For example, the strong role in community activities, identified from certain individuals, was indicative of a prescriptive norm and strong personal values. In this case the individual's self-identity was more defined than other individuals, who subscribed to the principles of sociality; however, the social norm was of a descriptive type.

Habit also plays a major role in shaping an individual's behaviour, where familiarity and routinisation of a process resulted in waste recycling behaviour being under the control of procedural rationality. In this situation, any changes impacting upon attitude and social factors would have little influence on the individual's behaviour. Those individuals; however, who have not incorporated the activity of household waste recycling into a routine would be affected by social and attitudinal factors. Furthermore, facilitating conditions may disrupt their routine to the point of the individual having to assimilate new behaviours and to learn new habits. During this unfreezing stage of the routine, the individual may become subject to the influence from other factors which would not normally impact on their behaviour.

The TIB illustrates how behaviours are driven from two perspectives. Firstly, recycling behaviour may either be controlled by habit or behavioural intention with facilitating conditions such as convenience and knowledge acting as a moderator of

an individual's behaviour through influencing the degree of procedural rationality associated with the activity. Secondly, a cognitive-evaluative relationship was established in which cognitive and affective attitudes interact with social factors and degree of internalisation of the social environment forming intention toward household recycling. Intention is also subject to influence by facilitating conditions which may influence an individual's attitude or, their perception of the social group and subjective culture. In this regard, facilitating conditions act in two ways to influence behaviour which are indirectly as a moderator of procedural rationality between habit and intention and directly in influencing social and attitudinal factors on intention.

Analysis on the data from the 2006 Council survey (RBWM, 2006) was conducted on respondents who "recycled everything they could" and "recycled a lot but not everything". There were; however, insufficient numbers of infrequent/non-recyclers from the survey for inclusion in the analysis. The research also challenged the findings from previous research which uses other models such as the TPB and MOA, where the absence of key variables such as '*personal norms*', '*self-identity*', '*affect*' and '*habit*' will almost certainly result in different observations from the analysis of the data. Conversely, there was congruence with previous research associated with recycling in that it is essentially 'normative driven' based on interacting factors within the community for kerbside schemes and 'attitude driven' for bring-site recycling. However, the picture may vary based on the type of container with a wheeled bin protecting the user from the visible perception of others in the community. The approach to the current research; therefore, provides a useful platform from which to design behavioural change programmes based on the findings using the TIB as a means of investigation of recycling behaviour.

The most commonly used models to examine recycling behaviour are the TRA and TPB. It is puzzling; however, that the TIB, which was developed around the same

time as the TRA, was not considered as an alternative model to the TRA/TPB to examine recycling behaviour. One possible explanation is that the TIB was initially designed for use in clinical psychology applications and the TRA/TPB environmental applications. Much research followed using the latter model as recycling became more of a popular subject and new models developed. The TIB in this regard was overlooked in terms of its potential as an household recycling behaviour model. In addition there was a paradigm shift of the author (H.C. Triandis) in moving into research on cross cultural psychology relatively soon after the introduction of the TIB. In conclusion, it is hoped that with the publication of this research the use of the TIB as a behavioural model to examine and predict recycling behaviour (and use as a segmentation tool) will grow in popularity.

9.3 Waste Policy and Strategy Implications

This section examines the implications of the findings from this research in terms of waste management policy and strategy for RBWM and similar types of Councils in the South East of England. It also includes the implications associated with the wider elements of waste recycling infrastructure and service design.

9.3.1 Recycling behaviour

In terms of recycling behaviour, the findings suggest that policy recommendations flowing out of this research should deal with two areas of improvement, based on the type A and type B characteristics identified from the research.

The type B characteristic is associated with self-restriction in recycling behaviour, therefore, in order to encourage individuals with type B characteristics to participate further in recycling schemes, it is suggested that incentives that persuade the individual to exceed their current level of effort be considered. This may include the introduction of a reward scheme providing benefits to householders for recycling their waste. Conversely, type A individuals who are not self-restricting in their

recycling behaviour may present problems to the recycling service arising out of them setting out for collection materials that currently cannot be recycled. In this regard, incentives targeted toward individuals with type A characteristics would focus on provision of information that discourages this behaviour. An example is the issue of a leaflet explaining why certain materials such as mixed plastics cannot always be recycled due to lack of market availability, and the negative impact it may have on the general recycling collection. The specific areas around the key objectives from the TIB discussed in the previous chapter for developing strategies for implementation of incentives in shaping recycling behaviour of type A and B characteristics is discussed in the following sub-sections.

9.3.2 Improving attitudes and enhancing social norms

Individuals with type A characteristics, who are not self-restricting in their recycling behaviour, displayed a clear focus on the consequences of recycling and the evaluation of these consequences which include benefits for the environment, economy and future generations. These individuals appear to have established a local-to-global link where positive environmental activities, such as recycling of household waste, provide wider benefits to improving the local and global environment. Their predominantly cognitive evaluation process may be associated with strong personal norms toward recycling and strong self-identity. This may manifest itself in terms of an individual who personally identifies themselves as someone who is concerned with environmental issues and sees household waste recycling as a means to addressing these concerns.

There may also be an active community role and subscription to a prescriptive social norm reflecting the individuals' moral code. Within this characteristic; however, there may be an extreme banding of individuals in which there is an expectation that all materials which are capable of being recycled should be. This is not always possible due to demographics, political agendas and availability of markets for recyclables. Behavior arising out of this situation may result in disaffection of the individual with

the service pushing them toward a type B characteristic. Intervention schemes, for individuals with type A characteristics, would include provision of information on what cannot be recycled and why, with positive messaging as to what is being done to improve recycling and, encouraging them to take part in community initiatives which champion their pro-recycling characteristics. Examples of the latter include becoming a Master Composter or taking an active role on a local recycling project or action group to improve recycling. Community Based Social Marketing.

Conversely, individuals who exhibit self-restricting characteristics, are driven by emotion in their decision-making, are less cognitively focused and may not always establish a local-to-global sustainability linkage. Efforts by such individuals to recycle may be driven from emotive perception where influence to recycle from within the community is more likely to be associated with observation of the behavior of others i.e. a descriptive norm. These individuals may tend to be more aspirational toward the benefits of recycling and; therefore, may not visualize the long-term benefits that this would bring to them, their community and the environment as a whole. Influence to recycle may be more associated with level of effort required to recycle and to find out what materials are available for recycling. Interventions to change behavior of individuals with type B characteristics include providing feedback on recycling performance in the community to encourage interest in recycling and, provision of information on new programmes to encourage participation. This may include for example information on recycling reward schemes and information on what happens to materials that are recycled such as metal cans to aeroplanes. From a wider community perspective where the social norm is predominantly descriptive, the challenge would be to create the perception of recycling as *de-rigueur* with emphasis on peer pressure, community influence and positive messaging.

9.3.3 Habit and intention

Taking recyclable materials to the bring site or HRC as a routine activity is more likely to be associated with type A characteristics. Pre-sorting of waste materials for recycling is also more likely to be a routine activity, once learned and assimilated. Conversely, for type B characteristics habitual behavior in terms of waste management may be placing waste in the residual bin. Therefore, learning of any new activity which may involve a degree of personal effort on their behalf such as pre-sorting or disposal of materials beyond the kerbside collection service may not be successful. In this regard, it is likely that recycling for type A is more associated with habit, whereas type B is predominantly under the control of intention. A downside to activities under habitual control is that certain habits may be counterproductive to recycling such as continuing to place materials in the wrong container after a service change. In this case, the challenge is for these 'bad' habits to be broken and replaced with new behaviours which would be assimilated and eventually become habitual.

In terms of intervention programmes and policy changes targeted toward individuals with type A and B characteristics; this would depend on the complexity of the activity for the former (type A), and infrastructure/service (I/S) factors for the latter (type B). An example is where residents are provided with an alternative scheme in which light cardboard was collected with paper recycling. Complexity is associated with pre-sorting light cardboard from other cardboard and I/S issues associated with convenience, container provision and information. The intervention for type A individuals would be focused on information about the scheme and why this is being introduced and feedback on how the scheme is performing. Intervention for type B individuals would focus on convenience to reduce effort, information based on assistance e.g. help-lines and communication through door-stepping etc. From this programme emphasis is placed on encouraging recycling behavior through unfreezing old habits, introducing and re-freezing new habits and seeking to make

the transition from learning the new activity (I control) to routine behavior (H control) as convenient and positive as possible.

9.3.4 Mediating role of facilitating conditions

The research findings identified facilitating conditions as a moderator of an individual's behavior through changes in behavioural intention and direct control of behavior. This relationship depends on whether the activity is under habitual control or intention driven; however, depending on whether the service is an established or newly introduced dictates as to what stage of the habit-intention continuum they would be in. Facilitating conditions identified from the research include convenience, knowledge and awareness, information, infrastructure and service (I/S).

For individuals with type A characteristics, focus would be on ensuring recycling behaviours result in the right materials being recycled and in this regard, emphasis would be on intervention schemes that inform and provide assistance to enable these individuals to participate. For individuals with type B characteristics, emphasis would be on targeting intervention and policy toward building suitable infrastructure such as single containers for all recyclables and service capacity to address convenience and reduce levels of effort.

9.4 Recommendations for policy

Table 9.1 shows an example of suggested recommendations for waste management policy and local authority intervention schemes. These are not new schemes and there are many tried and trusted initiatives that are in place which have varying levels of success. The application based on selective targeting of individuals based on behavioural preference is a novel approach, which may be considered for further policy development.

Table 9.1 Policy and Strategy-intervention recommendations

Policy- Strategy	Target	Intervention Scheme
Type A/B identification and behavioural classification	Central Government General public, Local Authority Academic and professional associations	Census LA surveys Research surveys
Improving attitudes and enhancing positive social norms.	Type A characteristics	Information on what cannot be recycled ; encourage participation in community recycling initiatives (e.g. Master Composters)
	Type B characteristics	Feedback on community recycling performance ; information leaflets and conversion flyers (e.g. cans to aeroplanes etc)
Habits Unfreezing old habits and refreezing new habits	Type A	Information on new service and instruction re how to use
	Type B	Recycling advice on what is available; Door-stepping and Help-lines to assist in participation.
Improving conditions for recycling		
Improving knowledge and awareness	Type A and B	Feedback on performance Information on service Information on outputs Community newsletters
Making recycling more convenient	Type B	Help lines, easy to understand information on service
Easier access to information on recycling	Type A and B	Door-stepping and Help-lines Recycling advice Use of social media
Infrastructure		Introduce new recycling schemes e.g. co-mingled, collection of food waste, new processing technologies (e.g. AD, IVC) Localism initiatives
Service		Mandatory collection of waste streams Standardisation of services

9.4.1 Infrastructure and Service Implications

In terms of the wider impact from infrastructure and service implications, building upon the convenience factors of facilitating conditions consideration could be given to the expansion of materials collected for recycling. This includes the introduction of kerbside food waste collections to address the Government position on 'smelly waste' (Defra, 2011) where provision of new infrastructure such as anaerobic digestion (AD) and in-vessel composting (IVC) are integral to treatment of food waste. This improves convenience to residents and is designed to encourage greater recycling from individuals with type B characteristics. Conversely, emphasis on localism to encourage community composting and local recycling schemes, would be ideally suited to individuals with type A characteristics with strong community roots and moral principles (although not all type A would subscribe to this). Finally from a Government intervention, mandatory collection of waste streams for recycling would encourage local authorities to put in place appropriate infrastructure and services to meet the needs of local residents, backed by funding streams.

9.5 Suggestions for future research using TIB

An added benefit of the research is that the approach can be used not only by academic researchers to study similar or related environmental behaviours but also by Government and by local authorities as a basis for customer profiling and waste policy development. The approach conducted throughout this thesis provides a linkage to data from waste related performance and participation in recycling schemes to behaviour patterns in which habit, intention and facilitating conditions are the main clusters of behavioural influence.

An important factor identified from this research is that future questionnaires should be designed, wherever possible, so as not to ~~rely on~~ extraction of certain questions as '*proxies*'. The benefits of the provision of directly related questions were identified from the household interviews which provided answers directly related to TIB

components and the Council survey for which not all TIB components could be obtained as proxies. While such questions may not be immediately seen by Councils as suitable for public surveys it is hoped that the findings of this research show that the practical the theoretical elements could be of value to them in their deliberations. This is not necessarily the case for developing questionnaires from academic sources.

With regard to future research applications into investigation of household recycling using TIB, these may be divided into academic and waste management practitioner. In this regard, the TIB may be used in further applications beyond its current 'cause and effect' application as an explanatory model of household recycling behaviour by incorporating tests to examine magnitude and direction. This would identify feedback loops and critical pathways, providing a greater appreciation of the workings of the TIB model as applied to recycling behaviour. A suggested approach is the use of 'structured equation analysis' or confirmatory factor analysis and regression. The former approach using the TIB was conducted in a clinical psychology setting (Gagnon et al, 2006).

The TIB may be considered as a model to explore elements of past experiences and childhood influences with regard to household recycling. This would involve the use of the TIB as an exploratory model (as opposed to explanatory) to identify how the values, beliefs social practices and attitudes are formed toward recycling or another environmental activity. However, this is specific to the individual and not applicable on a wider community basis. The TIB may be considered for use from a reflexive awareness perspective to envisage alternatives to behaviour. The various choices of recycling behaviour from an individual represent their 'behavioural state', which is illustrated in terms of the arrangement of predictor variables for an individual or group and is based on the concept of 'liminality'²⁶. The TIB would therefore be used

²⁶ Liminality is a particular neurological or metaphysical state of consciousness or

as a predictive model to illustrate each respective 'behavioural state' and coupled with behavioural change models, used to identify how the individual moves between states based on the respective intervention. However, this was not achievable based on the data available for the research and the methodology deployed.

Verplanken et al (1998a) described habits as "learned, goal-directed acts that become automatic responses in specific situations". This suggests that the act is performed without full conscious reasoning, however many behaviours such as recycling involve more than one action (bottle washing, storage, set out). Previous research on the construct of habit; however, identified a difficulty in measurement (Eagly and Chaiken, 1993; Verplanken, 2006) which is compounded where more than one step of action is required. Supporting this observation Knussen and Yule (2008) suggested that consideration of each respective step associated with recycling as an individual habit would be more appropriate. This suggests that there may be more than one suitable model to describe recycling activity as each respective step may be triggered by different stimuli or automatic activation of cognitive factors (Ajzen, 2002; Verplanken, 2006). The TIB may be used to compare recycling and disposal of residual waste in terms of whether it is a single habitual activity or a series of steps and the degree of procedural rationality associated with recycling and residual waste disposal.

9.5.1 Segmentation and classification

The TIB is not a segmentation or 'classification' model. The research for this thesis resulted in the development of two sample groups from the 2006 survey based on recycling behavioural preference and two types of individual from the 2009 interviews based on effort required to recycle and degree of self-restriction (type A and B). Classification models are based on segmentation of behavioural choices.

unconsciousness as to where an individual is regarding their behaviour (Turner, 1967; Simpson and Weiner, 1989).

They may be termed pen pictures of what a recycler is or is not (Tucker, 2001b, 2003). These models can range from representation of a single behaviour or a range of behaviours at varying levels of activity. The former type includes that provided by De Young (1989) and Tucker (2001b, 2003) who provided a classification of recyclers based on the existence of barriers in relation to attitudes and norms to determine an individual's decision to act.

With regard to barriers to recycling, research by WRAP (2008) produced a consumer profile based on recycling competence. This model was developed on the basis that recycling behaviour can be understood in relation to the established competences learning model (Dreyfus and Dreyfus, 1986). The model is based on the principle that as people learn 'the system' they move from 'unconsciously incompetent' (not aware, don't care) to 'unconscious competence' (embedded systematic routines carried out without conscious effort). There is therefore an opportunity to utilise the TIB as a segmentation model for waste practitioners based on a transformational use of the TIB in accordance with the concept of liminality²⁷.

9.5.2 Local authority community profiling

Another practitioner suggested application of the TIB is use by local authorities to investigate the pattern of recycling behaviour within communities. This may be used to contribute to the development of effective intervention strategies to change behaviour. The research for this thesis did not examine non-participation in recycling schemes, however inclusion of this in future research this would provide an overall appreciation of the recycling picture from strong participants to non-participants with the aim of using the findings for developing future behavioural change programmes and waste policy.

²⁷ The threshold or initial stage of a process

9.6 Concluding comments

This research has sought to address household waste recycling behaviour, where the literature on this topic is complex, diverse, contradictory and inconclusive.

Research studies on this subject have provided little consensus in clarifying the position regarding the key determinants of household recycling behaviour. The use of multi-attribute models to investigate household waste recycling behaviour is increasing in popularity. Application of the TIB to this area brings a novel but powerful means of identifying the key determinants of household waste recycling behaviour, how they interact with each other and how the findings may be applied to develop waste management policy and explore other areas of environmental interest. Finally, the research concluded that the TIB provides an equally if not better means to examine the key determinants of recycling as that provided by other multi-attribute models and their expanded versions.

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APPENDIX 1: RBWM 2006 Council Survey

Viewpoint Panel Survey

Recycling

In this survey, the Council is interested in finding out the views of Panel members on your attitudes towards the environment and in particular recycling. The survey also covers questions on involvement in the local community.

Attitudes to the environment

1. Please indicate how concerned you are about each of the following? **Please tick one box for each statement**

	NOT AT ALL CONCERNED	NOT VERY CONCERNED	FAIRLY CONCERNED	VERY CONCERNED
The effect of climate change / global warming on <u>your life</u>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
The effect of climate change / global warming on <u>your children's lives i.e. the next generation</u>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
The amount of waste / rubbish households dispose of and don't recycle / reuse	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
Pollution in your local area	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4

Attitudes to recycling

2. Every hour, enough rubbish is put into household bins, to fill the Albert Hall. Who do you think should be responsible for what happens to this rubbish? **Please tick all that apply**

The Government ☐1

The Council	<input type="checkbox"/> ₂
Businesses	<input type="checkbox"/> ₃
Everyone has a responsibility	<input type="checkbox"/> ₄
Don't Know	<input type="checkbox"/> ₅

3. Which of the following best describes what you think happens to most of this rubbish after the Council has collected it? ***Please tick one only***

It is buried in landfill sites	<input type="checkbox"/> ₁
It is incinerated	<input type="checkbox"/> ₂
It is recycled	<input type="checkbox"/> ₃
It is not my concern	<input type="checkbox"/> ₄
Don't Know	<input type="checkbox"/> ₅

4. How important do you think it is to recycle the rubbish that households produce?
Please tick one only

Very important	<input type="checkbox"/> ₁
Fairly important	<input type="checkbox"/> ₂
Not very important	<input type="checkbox"/> ₃
Not at all important	<input type="checkbox"/> ₄
Don't Know	<input type="checkbox"/> ₅

5. Which of the following statements best describes your attitude to recycling?

Please tick one only

I do not recycle	<input type="checkbox"/> ₁
I recycle if it does not require additional effort	<input type="checkbox"/> ₂
I recycle even if it requires additional effort	<input type="checkbox"/> ₃
Don't know	<input type="checkbox"/> ₄

6. How convenient is it for you personally to recycle your household waste? *Please tick one only*

Very convenient	<input type="checkbox"/> ₁
Fairly convenient	<input type="checkbox"/> ₂
Not very convenient	<input type="checkbox"/> ₃
Not at all convenient	<input type="checkbox"/> ₄
Don't know	<input type="checkbox"/> ₅

7. How would you rate your knowledge of how to recycle on a scale of 1 to 5, where '5' is know a lot and '1' is know nothing? *Please tick one only*

1 Know nothing	<input type="checkbox"/> ₁
2	<input type="checkbox"/> ₂
3	<input type="checkbox"/> ₃
4	<input type="checkbox"/> ₄
5 Know a lot	<input type="checkbox"/> ₅

8. How would you rate your interest of what happens to items sent for recycling on a scale of one to five, where '5' is interested a lot and '1' is not interested?

Please tick one only

1 Not interested	<input type="checkbox"/>	1
2	<input type="checkbox"/>	2
3	<input type="checkbox"/>	3
4	<input type="checkbox"/>	4
5 Interested a lot	<input type="checkbox"/>	5

9. How often do you purchase recycled products available on a scale of one to five, where '5' is buy a lot and '1' is buy nothing? **Please tick one only**

1 Buy nothing	<input type="checkbox"/>	1
2	<input type="checkbox"/>	2
3	<input type="checkbox"/>	3
4	<input type="checkbox"/>	4
5 Buy a lot	<input type="checkbox"/>	5

10. Which of the following statements best describes how much you recycle? **Please tick one only**

I do not recycle	<input type="checkbox"/>	1	CONTINUE TO Q11
I recycle sometimes	<input type="checkbox"/>	2	GO TO Q12
I recycle a lot but not everything that can be recycled	<input type="checkbox"/>	3	GO TO Q12

I recycle everything that can be recycled	<input type="checkbox"/> _4	GO TO Q12
Don't know	<input type="checkbox"/> _5	GO TO Q12

11. Why don't you recycle? *Please tick all that apply*

I cannot be bothered	<input type="checkbox"/> _1
I am too busy	<input type="checkbox"/> _2
I do not see the point of recycling	<input type="checkbox"/> _3
I do not know how to recycle	<input type="checkbox"/> _4
Other – Specify	<input type="checkbox"/> _5
Don't know	<input type="checkbox"/> _6

12. Which of the following recycling services are provided in your area? *Please tick all that apply under Q12*

13. And which of the following recycling services do you use? *Please tick all that apply under Q13*

	Q12	Q13
Doorstep/kerbside recycling collection of 1 material only	<input type="checkbox"/> _1	<input type="checkbox"/> _1
Doorstep/kerbside recycling collection of more than 1 material	<input type="checkbox"/> _2	<input type="checkbox"/> _2
Flats/communal recycling facility	<input type="checkbox"/> _3	<input type="checkbox"/> _3
Public recycling bank (e.g. supermarket bottle bank)	<input type="checkbox"/> _4	<input type="checkbox"/> _4
Recycling centre at household waste site ("tip")	<input type="checkbox"/> _5	<input type="checkbox"/> _5
None of the above	<input type="checkbox"/> _6	<input type="checkbox"/> _6

	Q12	Q13
Don't know	<input type="checkbox"/> 7	<input type="checkbox"/> 7

14. Are you aware of the household recycling collection service operated by the Council? **Please tick one only**

Yes	<input type="checkbox"/> 1	CONTINUE TO Q15
No	<input type="checkbox"/> 2	GO TO Q17

15. How often do you use the household recycling collection service operated by the Council? **Please tick one only**

Every week	<input type="checkbox"/> 1
Every other week	<input type="checkbox"/> 2
Once in a while	<input type="checkbox"/> 3
Never	<input type="checkbox"/> 4

16. How often do your neighbours use the household recycling collection service?
(Please note that this question is based upon perception i.e. there is no right or wrong answers)? **Please tick one only**

Every week	<input type="checkbox"/> 1
Every other week	<input type="checkbox"/> 2
Once in a while	<input type="checkbox"/> 3
Never	<input type="checkbox"/> 4
Don't Know	<input type="checkbox"/> 5

17. What do you usually do when your refuse bin is overflowing? **Please tick one only**

Put extra waste at side of bin	<input type="checkbox"/> ₁
Save it for next collection	<input type="checkbox"/> ₂
Take the extra to the tip	<input type="checkbox"/> ₃
Try to squash it in the bin	<input type="checkbox"/> ₄
Try to recycle more	<input type="checkbox"/> ₅
My bin never overflows	<input type="checkbox"/> ₆
Other <i>specify</i>	<input type="checkbox"/> ₇

18. What do you usually do when your recycling container is overflowing? **Please tick one only**

Put extra waste at side of container	<input type="checkbox"/> ₁
Save it for next collection	<input type="checkbox"/> ₂
Take the extra to the tip	<input type="checkbox"/> ₃
Try to squash it in the container	<input type="checkbox"/> ₄
Put it in the refuse bin	<input type="checkbox"/> ₅
My container never overflows	<input type="checkbox"/> ₆
Other <i>specify</i>	<input type="checkbox"/> ₇

19. What percentage of people in your neighbourhood would you estimate recycle on a regular basis? (Please note that this question is based upon perception i.e. there are no right or wrong answers). **Please tick one only**

None	<input type="checkbox"/> ₁
1-25%	<input type="checkbox"/> ₂
26-50%	<input type="checkbox"/> ₃
51-75%	<input type="checkbox"/> ₄
75-99%	<input type="checkbox"/> ₅
100%	<input type="checkbox"/> ₆
Don't Know	<input type="checkbox"/> ₇

20. Do you ever take items to charity shops, to be recycled? **Please tick one only**

Yes	<input type="checkbox"/> ₁
No	<input type="checkbox"/> ₂

21. To the best of your knowledge, which of the following household items do you think can be recycled in your area? **Please tick all that apply**

Paper (e.g. newspapers/ magazines)	<input type="checkbox"/> ₁
Card/cardboard (e.g. cereal boxes)	<input type="checkbox"/> ₂
Glass (e.g. bottles and jars)	<input type="checkbox"/> ₃
Food and drink cans/tins	<input type="checkbox"/> ₄
Plastics containers (e.g. milk cartons/drinks bottles)	<input type="checkbox"/> ₅
Textiles (e.g. clothing)	<input type="checkbox"/> ₆
Food waste for compost	<input type="checkbox"/> ₇

Garden waste for compost	<input type="checkbox"/> 8
None of the above	<input type="checkbox"/> 9
Don't know	<input type="checkbox"/> 10

22. Looking at this list below, please indicate how often you recycle each of these items when you dispose of them? **Please tick one box for each item**

	Every time	Most times	Some times	Never	Not applicable
Paper (e.g. newspapers/magazines)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Card/cardboard (e.g. cereal boxes)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Glass (e.g. bottles and jars)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Food and drink cans/tins	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Plastic containers (e.g. milk cartons, drinks bottles)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Textiles (e.g. clothing)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Food waste for compost	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Garden waste for compost	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

23. What, if anything, motivates you to recycle? **Please tick all that apply**

Reduces "amount of rubbish disposal" (landfill/ incineration)	<input type="checkbox"/> 1
Saves space in my waste bin/ in home	<input type="checkbox"/> 2
Good for environment/ Saves resources	<input type="checkbox"/> 3
Reduces "pollution"	<input type="checkbox"/> 4

Good for the economy	<input type="checkbox"/> 5
Good for future generations/ children	<input type="checkbox"/> 6
Feel guilty if don't/ better if I do	<input type="checkbox"/> 7
Because it's easy/ no extra effort	<input type="checkbox"/> 8
Because my friends and neighbours do	<input type="checkbox"/> 9
Don't know	<input type="checkbox"/> 10
Other (please specify)	<input type="checkbox"/> 11

Nothing – don't do it	<input type="checkbox"/> 12

24. What, if anything, would encourage you to recycle more / start recycling? **Please tick all that apply**

Easier to use services.	<input type="checkbox"/> 1
Better information about what / how to recycle.	<input type="checkbox"/> 2
Financial incentive to recycle.	<input type="checkbox"/> 3
Other – specify	<input type="checkbox"/> 4

Nothing	<input type="checkbox"/> 5
Don't Know	<input type="checkbox"/> 6

Information on recycling

25. Have you seen or heard any advertising or promotion about recycling in the last 6 months? **Please tick one only**

Yes	<input type="checkbox"/> 1	CONTINUE TO Q26
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No	<input type="checkbox"/> 2	GO TO Q27
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26. Where have you seen/heard advertising or promotion about recycling in the last 6 months? **Please tick all that apply**

Television	<input type="checkbox"/> 1
National newspaper	<input type="checkbox"/> 2
Local newspaper	<input type="checkbox"/> 3
Radio	<input type="checkbox"/> 4
Poster	<input type="checkbox"/> 5
Local supermarket	<input type="checkbox"/> 6
Leaflet /letter delivered to your home	<input type="checkbox"/> 7
Other	<input type="checkbox"/> 8
Don't know	<input type="checkbox"/> 9

27. In which, if any, of the following ways have you ever received or read information relating to the recycling or waste services provided by the Council? **Please tick all that apply under Q27**

28. For each type of information received/read could you please indicate how easy or difficult you found this information to understand. **Please tick one box next to each type of information used under Q28**

Q27	Q28				
	Very Easy	Quite Easy	Quite Difficult	Very Difficult	Don't know

Leaflet <input type="checkbox"/> _1	<input type="checkbox"/> _1	<input type="checkbox"/> _2	<input type="checkbox"/> _3	<input type="checkbox"/> _4	<input type="checkbox"/> _5
Press Release / Article <input type="checkbox"/> _2	<input type="checkbox"/> _1	<input type="checkbox"/> _2	<input type="checkbox"/> _3	<input type="checkbox"/> _4	<input type="checkbox"/> _5
Council Newsletter / Magazine <input type="checkbox"/> _3	<input type="checkbox"/> _1	<input type="checkbox"/> _2	<input type="checkbox"/> _3	<input type="checkbox"/> _4	<input type="checkbox"/> _5
Website <input type="checkbox"/> _4	<input type="checkbox"/> _1	<input type="checkbox"/> _2	<input type="checkbox"/> _3	<input type="checkbox"/> _4	<input type="checkbox"/> _5
Other (specify) <input type="checkbox"/> _5	<input type="checkbox"/> _1	<input type="checkbox"/> _2	<input type="checkbox"/> _3	<input type="checkbox"/> _4	<input type="checkbox"/> _5
Not read / received anything <input type="checkbox"/> _6	PLEASE GO TO Q30				

29. To what extent do you agree or disagree with each of the following statements about promotional material as listed in Q28 for recycling? **Please tick one box next to each type of information used under Q29**

	Agree strongly	Agree slightl y	Neither/ nor	Disagree slightly	Disagree strongly
I learned something from it	<input type="checkbox"/> _1	<input type="checkbox"/> _2	<input type="checkbox"/> _3	<input type="checkbox"/> _4	<input type="checkbox"/> _5
It was interesting	<input type="checkbox"/> _1	<input type="checkbox"/> _2	<input type="checkbox"/> _3	<input type="checkbox"/> _4	<input type="checkbox"/> _5
Made me think about recycling	<input type="checkbox"/> _1	<input type="checkbox"/> _2	<input type="checkbox"/> _3	<input type="checkbox"/> _4	<input type="checkbox"/> _5
I enjoyed it	<input type="checkbox"/> _1	<input type="checkbox"/> _2	<input type="checkbox"/> _3	<input type="checkbox"/> _4	<input type="checkbox"/> _5
I recycled more after seeing it	<input type="checkbox"/> _1	<input type="checkbox"/> _2	<input type="checkbox"/> _3	<input type="checkbox"/> _4	<input type="checkbox"/> _5

Composting

30. Do you compost at home? **Please tick one only**

Yes	<input type="checkbox"/> ₁	CONTINUE TO Q31
No	<input type="checkbox"/> ₂	GO TO Q32

31. Why do you compost? **Please tick all that apply**

It helps in the garden	<input type="checkbox"/> ₁
It helps reduce the amount of rubbish I put in my bin	<input type="checkbox"/> ₂
It helps reduce the amount of rubbish that is sent to landfill	<input type="checkbox"/> ₃
Because my neighbours and friends do	<input type="checkbox"/> ₄
Other – specify	<input type="checkbox"/> ₅

Don't Know	<input type="checkbox"/> ₆

NOW GO TO Q33

32. Why don't you compost? **Please tick all that apply**

I don't have time	<input type="checkbox"/> ₁
It attracts pests	<input type="checkbox"/> ₂
It is smelly	<input type="checkbox"/> ₃
I do not know how to	<input type="checkbox"/> ₄
Other – specify	<input type="checkbox"/> ₅

Don't Know	<input type="checkbox"/> ₆

33. Are you aware of the subsidised home composters available from the Council website? *Please tick one only*

Yes	<input type="checkbox"/> ₁
No	<input type="checkbox"/> ₂

Your local community

Thinking now about the local area in which you live.

34. Do you agree or disagree that you can influence decisions that affect your area?
Please tick one only

Strongly Disagree	<input type="checkbox"/> ₁
Disagree	<input type="checkbox"/> ₂
Not sure	<input type="checkbox"/> ₃
Quite Agree	<input type="checkbox"/> ₄
Strongly Agree	<input type="checkbox"/> ₅

35. Do you agree or disagree that this local area [within 15/20 minutes' walking distance] is a place where people from different backgrounds can get on well together? *Please tick one only*

Strongly Disagree	<input type="checkbox"/> ₁
Disagree	<input type="checkbox"/> ₂
Not sure	<input type="checkbox"/> ₃
Quite Agree	<input type="checkbox"/> ₄
Strongly Agree	<input type="checkbox"/> ₅

36. In the last year or so have you given unpaid help to any groups, clubs or organisations? **Please tick one only**

Yes	<input type="checkbox"/> ₁	CONTINUE TO Q37
No	<input type="checkbox"/> ₂	GO TO Q38

37. About how often, overall, would you say this was? **Please tick one only**

At least once a month	<input type="checkbox"/> ₁
Three times or more during the year	<input type="checkbox"/> ₂
Less than three times in the year	<input type="checkbox"/> ₃
Don't Know	<input type="checkbox"/> ₄

38. Overall how involved do you feel in the local community? **Please tick one only**

Not at all	<input type="checkbox"/> ₁
Not very much	<input type="checkbox"/> ₂
A fair amount	<input type="checkbox"/> ₃
A great deal	<input type="checkbox"/> ₄
Don't Know	<input type="checkbox"/> ₅

39. Are you aware of the Royal Borough's Community Partnership (The Local Strategic Partnership for the area)? **Please tick one only**

Yes	<input type="checkbox"/> ₁	CONTINUE TO Q40
No	<input type="checkbox"/> ₂	GO TO END
Don't Know	<input type="checkbox"/> ₃	GO TO END

40. How important do you feel the Community Partnership is for the Royal Borough's community? ***Please tick one only***

Very unimportant	<input type="checkbox"/> _1
Unimportant	<input type="checkbox"/> _2
Neither important nor unimportant	<input type="checkbox"/> _3
Important	<input type="checkbox"/> _4
Very Important	<input type="checkbox"/> _5
Don't Know / No opinion	<input type="checkbox"/> _6

***Many thanks for taking part in this Panel survey. Please return it, on or before
xxxxxxx, in the pre-paid envelope provided, or to:
BMG Research, FREEPOST, BM1078, Birmingham, B7 4AR***

«Panel_No»

APPENDIX 2: Example calculation Confidence Intervals and Hypothesis testing

1. Calculate a 95% confidence interval for the difference in the % of respondents who perceive 76% to 100% of people in their neighbourhood who recycle on regular basis from the following table.

Recycling status	% within sample group	Sample size
Recycle a lot (76% to 100% of people recycle)	46.4	98
Recycle everything (76% to 100% of people recycle)	60.3	140
Recycle a lot (1% to 75% of people recycle)	53.5	113
Recycle everything (1% to 75% of people recycle)	39.6	92
Total		443

The 95% confidence interval for the difference between the two groups is:

$$95\% \text{ CI} = (60.3 - 46.4) \pm 1.96 \sqrt{\frac{60.3 \times (100-60.3)}{140} + \frac{46.4 \times (100 - 46.4)}{98}}$$

$$95\% \text{ CI} = 13.9 \pm 1.96 \sqrt{17.1 + 25.4}$$

$$95\% \text{ CI} = 13.9 \pm 12.77 = (26.67, 1.13)$$

2. State the null hypothesis

"There is no difference in the proportion of respondents who perceive 76% to 100% of people in their neighbourhood recycle on a regular basis between

respondents who recycle a lot and those who recycle everything" (That is the observed difference of 13.9% is purely by chance)

3. *State the directional and non-directional alternative hypothesis*

Directional alternative hypothesis: "Respondents who recycle everything are more likely to be more likely to perceive 76% to 100% of people in their neighbourhood recycle on a regular basis than people who recycle a lot".

Non-directional alternative hypothesis: "There is a real difference in those respondents who perceive 76% to 100% of people in their neighbourhood recycle on a regular basis between respondents who recycle a lot and respondents who recycle everything".

4. *Which test (one-sided or two-sided) is appropriate to test the null hypothesis and why?*

The appropriate test is the two-sided one, because there is no theoretical basis to justify (prior to the survey) that either those who 'recycle everything' or those who 'recycle a lot' are more likely to perceive 76% to 100% of people in their neighbourhood recycle on a regular basis

5. *Can we reject the null hypothesis and why? Is the difference in perceived neighbourhood recycling between those who 'recycle a lot' and those who 'recycle everything' significant at the 95% level?*

The confidence interval for the difference does not include the value 0. This means we are 95% confident that the true population value for the difference in those respondents who perceive 76% to 100% of people in their neighbourhood recycle on a regular basis between respondents who recycle everything and

respondents who recycle a lot is not zero. Therefore the null hypothesis is rejected at the 95% level and conclude that there is a significant difference between those who 'recycle everything' and those who 'recycle a lot'.

6. *If we want to limit the probability of making a type I error to 1 out of 100, what can we say about the null hypothesis, can we reject it or not and why?*

To limit the probability of making a type I error to 1 out of 100, the 99% confidence interval for the difference between the two percentages is calculated as follows:

$$99\% \text{ CI} = (60.3 - 46.4) \pm 2.58 \sqrt{\frac{60.3 \times (100-60.3)}{141} + \frac{46.4 \times (100 - 46.4)}{98}}$$

$$95\% \text{ CI} = 13.9 \pm 2.58 \sqrt{17.1 + 25.4}$$

$$95\% \text{ CI} = 13.9 \pm 16.82 = (30.72, -2.92)$$

Since the confidence interval includes the value 0, this means that zero is a possible value for the difference between the two percentages based on the sample groups 'recycle a lot' and 'recycle everything'. Therefore the null hypothesis cannot be rejected at the 99% level, and concludes that "there is no differences in the proportion of respondents who perceive 76% to 100% of people in their neighbourhood recycle on a regular basis between those who recycle a lot and those who recycle everything".

APPENDIX 3: Categorical Regression for Determinants of Household Recycling Behaviour

Regression analysis seeks to predict an outcome variable from a single predictor variable and multiple regression seeks to predict an outcome from several predictors. Linear regression involves fitting a linear model based on a straight line, however other forms of regression are available to fit a model which best describes the data. The data may be continuous, ordinal or nominal where linear regression is normally used for the former (continuous) and non-linear regression used for ordinal and other types of categorical data. An explanation of the principles of regression and its application are provided in Field (2005) in which the general model for regression is based on the equation:

$$Y_i = (b_0 + b_1X_1 + b_2X_i + \dots + b_nX_n + \epsilon_i) \text{ - where:}$$

Y_i = the outcome to be predicted

X_1, X_2, X_i = the 1st second and i th value for each predictor variable

b_1, b_2, b_n is the gradient of the straight line fitted to the data (coefficients of 1st and 2nd and n _{th} predictors)

b_0 is the intercept of the gradient of the line

ϵ_i is the difference between the predicted and observed value for Y for the i th participant (referred to as the residual)

Introduction to regression analysis

Standard linear regression analysis involves minimizing the sum of squared differences between a response (dependent) variable and a weighted combination of predictor (independent) variables. Variables are typically quantitative, with (nominal) categorical data recoded to binary or contrast variables. As a result, categorical

variables serve to separate groups of cases, and the technique estimates separate sets of parameters for each group. The estimated coefficients reflect how changes in the predictors affect the response. Prediction of the response is possible for any combination of predictor values. Categorical regression quantifies categorical data by assigning numerical values to the categories, resulting in an optimal linear regression equation for the transformed variables. Categorical regression is also known by the acronym CATREG.

CATREG extends the standard approach by simultaneously scaling nominal, ordinal, and numerical variables. The procedure quantifies categorical variables so that the quantifications reflect characteristics of the original categories. The procedure treats quantified categorical variables in the same way as numerical variables. Using nonlinear transformations allow variables to be analysed at a variety of levels to find the best-fitting model.

Application of regression analysis for determinants of household recycling behaviour

The 2006 Council survey for Q10 provided a series of 4 responses which is shown in Table 1 below

Table 1: Claimed recycling behaviour from 2006 Council survey

Q10. Which of the following statements describe how much you recycle?	% of respondents	Sample Group	% of respondents
I do not recycle	1		
I recycle sometimes	2		
I recycle a lot but not everything that can be recycled	44	Recycle a lot	44
I recycle everything that can be recycled	53	Recycle everything	53

The goal of categorical regression with optimal scaling is to describe the relationship between a response (dependent) variable and a set of predictors (independent variables). By quantifying this relationship, values of the response can be predicted for any combination of predictors. The left hand side of the table contains the 4 categories of response to this question as asked in the survey. The two columns on the right hand side illustrate the sample groups used for analysis of proportional data in Chapter 6. The analysis using CATREG was conducted on the combined responses i.e. column 2 as the test will not work on an individual sample group in which all of the responses on the ordinal scale are the same. The objective of the exercise is to examine the influence of a set of behavioural determinants (predictors or independent variables) on claimed recycling behaviour (response or dependent variable). Table 2 displays the predictors used with their description and values

Table 2 Explanatory variables for household recycling behaviour

Question	Description	Value
Q1.3	Concern over landfill of recyclable waste	1,2,3,4
Q1.4	Concern over local pollution	1,2,3,4
Q4	Importance of recycling	1,2,3,4
Q6	Convenience of recycling	1,2,3,4
Q7	Awareness of recycling	1,2,3,4,5
Q8	Interest in recycling	1,2,3,4,5
Q16	Perception of neighbours recycling frequency	1,2,3,4
Q19	Perception of percentage recycling in neighbourhood	1,2,3,4,5,6
Q22.1	Frequency of recycling paper	1,2,3,4
Q22.2	Frequency of recycling cardboard	1,2,3,4
Q22.3	Frequency of recycling glass	1,2,3,4
Q22.4	Frequency of recycling food & drinks cans	1,2,3,4
Q22.5	Frequency of recycling plastic bottles	1,2,3,4
Q22.6	Frequency of recycling textiles	1,2,3,4
Q22.8	Frequency of recycling garden waste	1,2,3,4
Q34	Perceived influence in community decision making	1,2,3,4

Linear Regression

A standard linear regression analysis was initially undertaken to identify how well the regression model fits the data. The most common measure for this is the parameter R^2 which represents how much of the variance in the response is explained by the weighted combination of predictors. This is shown in Table 3

Table 3 Linear regression model summary

Model	R	R square	Adjusted R^2	Std Error of estimate
1	0.595	0.354	0.330	0.474

The closer R^2 is to 1, the better the model fits. Regressing claimed behaviour from Q10 on the predictors listed in Table 3 results in a R^2 of 0.354 indicating that approximately 35% of the variance in the preference rankings is explained by the predictor variables in the linear regression. A second parameter is the use of standardised coefficients for determining whether the response increases or decreases when the predictor increases and is indicated by a negative decrease and positive decrease in the beta coefficient. Each coefficient indicates the number of standard deviations that the predicted response changes for one standard deviation change in a predictor. The largest positive beta coefficients were associated with Q6 (0.213), Q7 (0.130) and Q22.1 (0.129) with an example of this being for Q6 recycling convenience, a one standard deviation change in this category yields an increase in predicted claimed behaviour of 0.213 standard deviations.

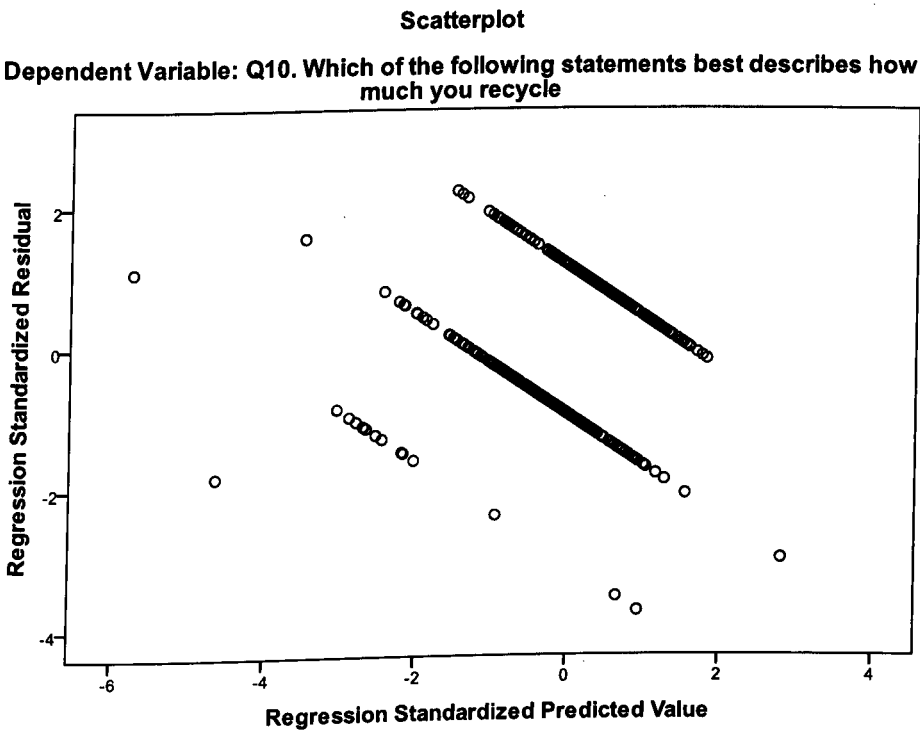
Data plots

The residuals are the differences between the values of the outcome predicted by the model and the values of the outcome observed from the sample data. They represent the error present in the model and if the difference is small then this results in a small residual and good fit for the model with all data points fitting on the regression line. Conversely, if the difference between the observed and the predicted

values are large then this suggests a poor fit of the sample data. Normal or unstandardised residuals are measured in the same units as the outcome variable and may be difficult to interpret across different models. To overcome this problem, standardised residuals which are the residuals divided by the standard deviation (transformed value for CATREG) are used.

A scatter-plot of the regression standardised residual against the standardised predicted values is shown in Figure 1. This provides a ranked pattern moving diagonally across the graph.

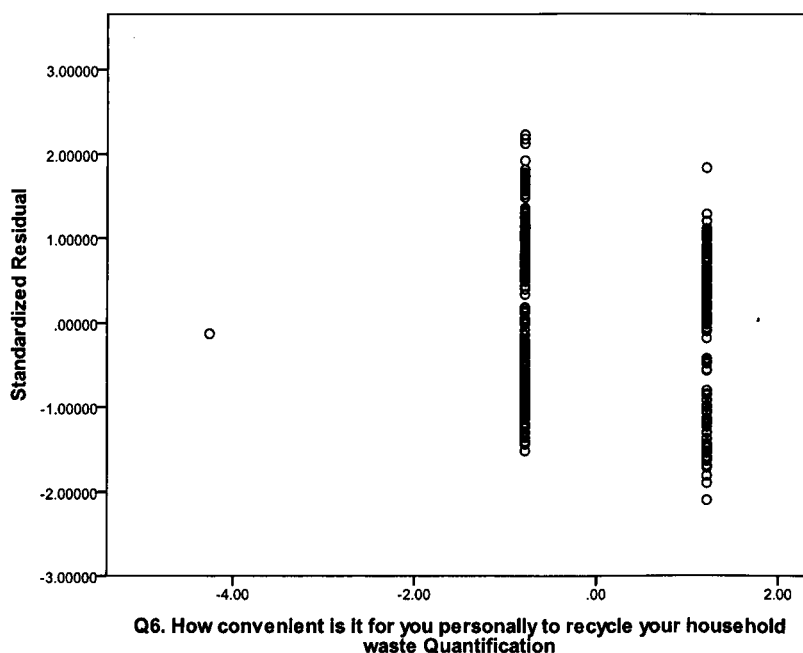
Figure 1: Standardised residuals against standardised predicted values



This suggests that ranked shape of the residual plots indicates that an ordinal treatment of the data should be used. A U-shape would indicate nominal treatment and no pattern suggests a good fit of the model.

Figure 2 provides a scatter plot for the standardised residuals against Q6 recycling convenience, which showed the largest beta value. Again a ranking pattern is observed which suggests an ordinal data pattern. The above observations would therefore support the fact that a good fit using linear regression is not suitable.

Figure 2: Standardised residual against recycling convenience predictor



Categorical Regression (CATREG)

The categorical nature of the variables and the non-linear relationship between claimed behaviour from Q10 and recycling convenience from Q6 suggests that regression on optimal scores may perform better than standard linear regression.

The analysis was set up for all parameters to be treated on an ordinal scale. A plot of each transformation was also provided for comparison. From Table 4 it is observed that the categorical regression yields an R^2 of 0.617 indicating that 62% of the variance in the transformed claimed behaviour rankings is explained by the regression on the optimally transformed predictors. Therefore transforming the predictors improves the fit over the linear regression approach.

Table 4 Categorical regression model summary

Multiple R	R square	Adjusted R ²	Apparent Prediction Error
0.785	0.617	0.576	0.383

Table 5 shows the standardised regression coefficients in which CATREG standardises the variables so only standard coefficients are reported. The F test value determines if omission of a predictor variable from the model with all the other predictors present significantly worsens the predictive capabilities of the model.

Table 5: Standardised coefficients for transformed predictors

Predictor Question	Beta	F	Sig	Zero Order	Partial	Part	Imp	Tolerance*
Q1.3	0.067	0.152	0.697	0.239	-.094	0.058	0.026	0.618
Q1.4	-0.093	1.396	0.244	-0.007	-0.137	-0.085	0.001	0.814
Q4	0.075	0.086	0.918	0.396	0.101	0.063	0.048	0.669
Q6	0.288	1.305	0.273	0.547	0.371	0.247	0.255	0.854
Q7	0.088	1.828	0.162	0.222	0.131	0.082	0.032	0.793
Q8	0.049	0.502	0.606	0.257	0.068	0.042	0.020	0.670
Q16	-0.078	2.036	0.154	0.027	-0.118	-0.074	-0.003	0.790
Q19	0.093	3.579	0.014	0.248	0.138	0.086	0.037	0.762
Q22.1	0.099	0.225	0.879	0.592	0.095	0.059	0.095	0.336
Q22.2	-0.083	0.568	0.567	0.344	-0.110	-0.068	-0.046	0.428
Q22.3	0.273	1.653	0.177	0.623	0.258	0.165	0.275	0.436
Q22.4	0.057	0.195	0.823	0.357	0.079	0.049	0.033	0.694
Q22.5	0.169	1.443	0.219	0.552	0.185	0.116	0.151	0.464
Q22.6	0.074	2.315	0.129	0.213	0.108	0.067	0.025	0.730
Q22.8	0.016	0.101	0.959	0.143	0.024	0.015	0.004	0.757
Q34	0.017	3.264	0.022	0.268	0.162	0.102	0.047	0.889

* Transformed variable

From Table 5 the largest coefficient occurs for Q6 recycling convenience and Q22.3 frequency of recycling glass. Therefore according to the model a one standard deviation (SD) increase in frequency of recycling glass gives a 0.273 increase in

predicted claimed behaviour, however a one SD increase in frequency of recycling cardboard results in a 0.08 decrease in claimed behaviour. The F values however are relatively small and are not significant however these values need to be interpreted with the rest of the information to identify the effect of omission of a particular variable. These are discussed in the following sections

Zero order correlation

This is the correlation between the transformed predictor and the transformed response. For this data the largest correlation occurs for glass recycling (Q22.3) followed by recycling of paper (Q22.1) and recycling convenience (Q6). However other variables in the model may confound the performance of a given predictor in predicting the response.

Partial Correlation

This measure removes the linear effects of other predictors from both the predictor and the response and equals the correlation between the residuals from regressing the predictor on the other predictors and the residuals from regressing the response on the other predictors. The squared partial correlation value corresponds to the proportion of the variance explained relative to the residual variance of the response remaining after removing the effects of the other variables. For example recycling convenience has a partial correlation of 0.371. Removing the effects of the other variables on claimed behaviour, recycling convenience explains $(0.371)^2 = 0.137 = 13.7\%$ of the variation in the claimed recycling behaviour rankings. Other variable such as recycling of glass and community decision making influence (Q34) also explain a proportion of the variance if the effects of the other variables are removed.

Part correlation

This provides an alternative to the partial correlation and removes only the effects from the predictor. Squaring this value yields a measure of the proportion of variance explained relative to the total variance of response. Therefore if the effects of all of

the other variables are removed from Q6 then the remaining part of recycling convenience explains $(0.247)^2 = 0.061 = 6.1\%$ of the variance in claimed recycling behaviour rankings.

Importance

In addition to the regression coefficients and the correlations, Pratt's measure of relative importance (Pratt, 1987) provides a means to interpret predictor contributions to the regression model. Large individual values relative to other values correspond to predictors critical to the model however comparatively low values suggest suppressor variables where that variable has a coefficient of a similar size to the important predictors. From Table 5 the largest values are from Q22.3 and Q6. Pratt's measure also equals the product of the regression coefficient and zero order correlation for a predictor. These products add to R^2 , so they are divided by R^2 yielding a sum of 1. In this regard the parameters Q22.3, Q6 and Q22.5 account for 68.1% of the importance for this combination of predictors.

Multicollinearity

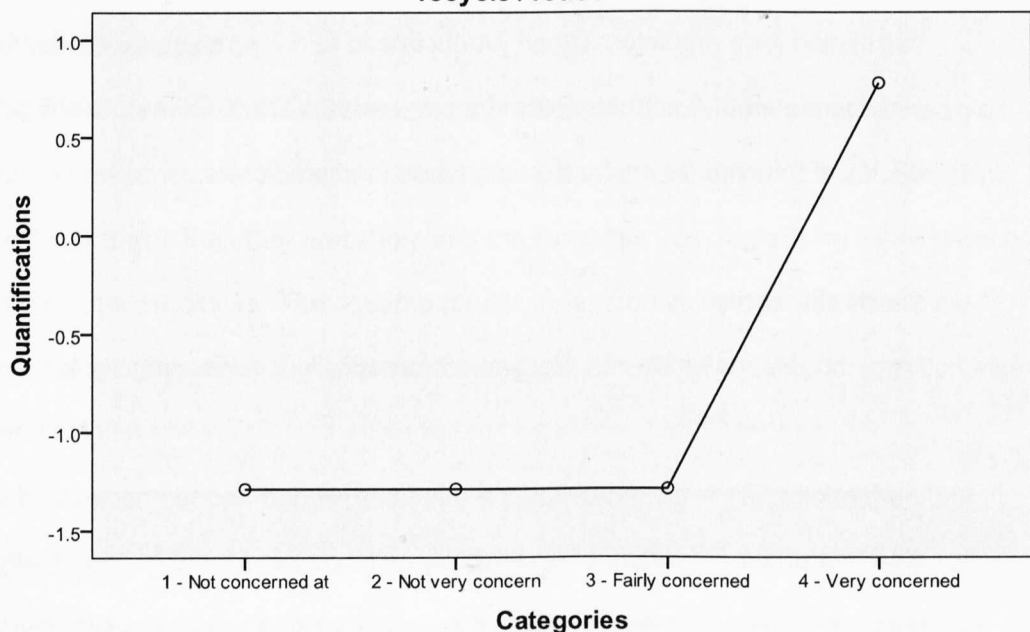
Large correlations between predictors dramatically reduce a regression model's stability and result in unstable parameter estimates. Tolerance reflects how much the independent or predictor variables are linearly related to one another and is a measure of the proportion of a variable's variance not accounted for by other predictor variables in the equation. If the other predictors can explain a large amount of a predictors variance in the model then that predictor is not required. A tolerance value close to 1 indicates that the variable cannot be predicted very well from the other predictors. However a variable with a low tolerance value contributes little information to the model and can cause computational problems. In addition large negative values of Pratt's importance measure indicate multicollinearity. From table 5 most of the tolerance values are relatively high with the exception of Q22.1, Q22.2 and Q22.5 being less than 0.5. However of these 3 parameters only Q22.2 has a

negative Pratt value. In this regard it is proposed that the predictors are predicted very well by other predictors and that multicollinearity is not a problem for the model.

Transformation plots

Plotting the original category values against their corresponding quantifications may reveal trends that might not be noticed in a list of the quantifications from the SPSS output tables. These plots are referred to as transformation plots and show the overall pattern of responses on an ordinal scale for the category being examined. A transformation plot for Q1.3, Q4, Q6, Q7 and Q19 is provided.

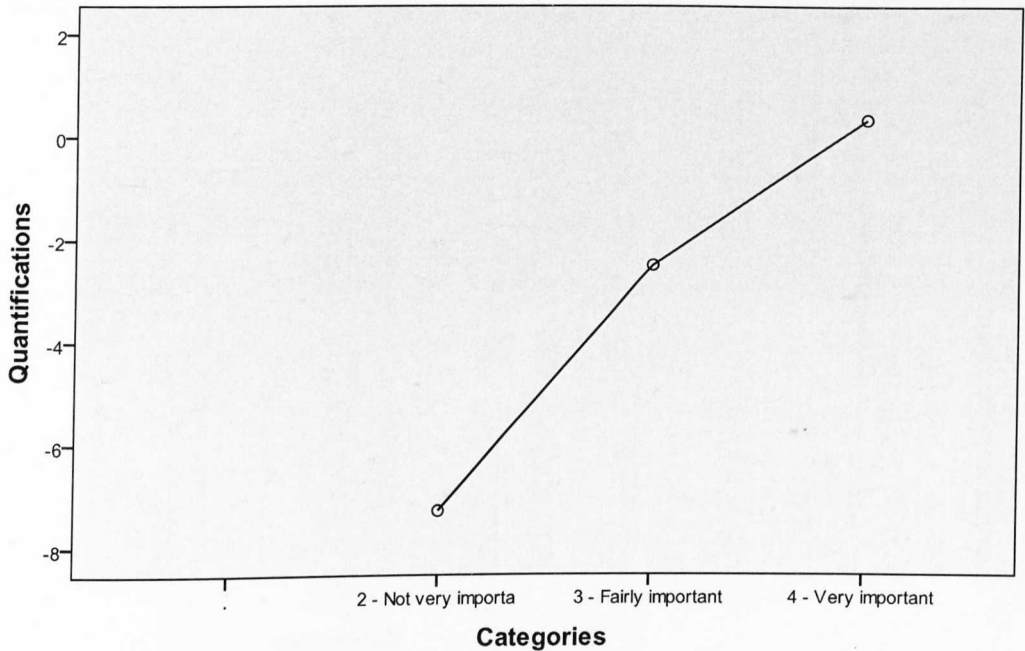
Transformation: Q1 3. Please indicate how concerned you are about each of the following - The amount of waste / rubbish households dispose of and don't recycle / reuse



Optimal Scaling Level: Ordinal.

Beta: .067.

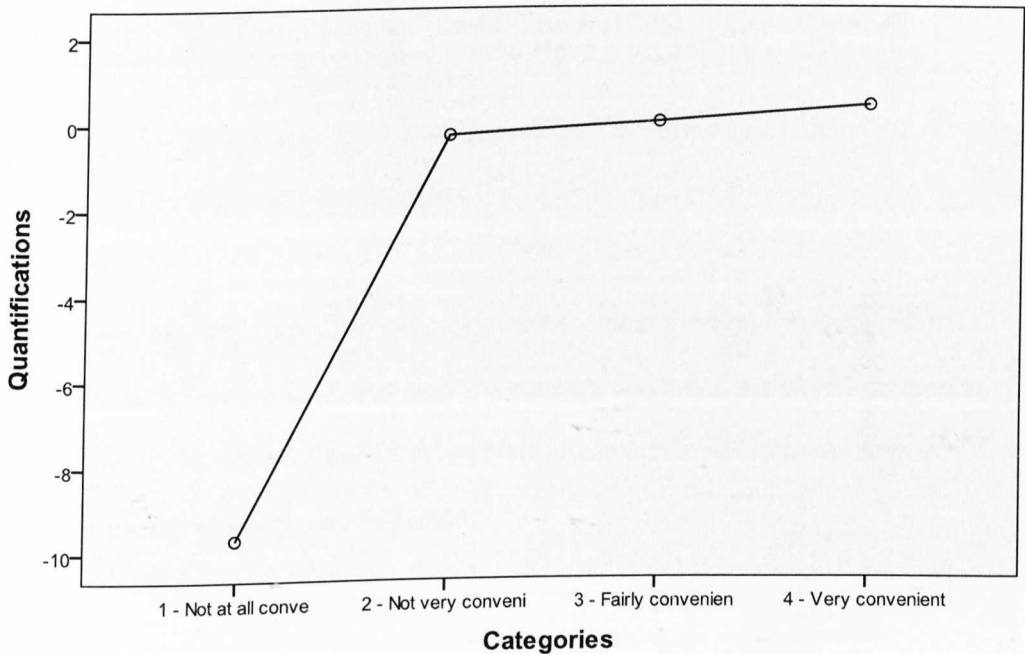
Transformation: Q4. How important do you think it is to recycle the rubbish that households produce



Optimal Scaling Level: Ordinal.

Beta: .075.

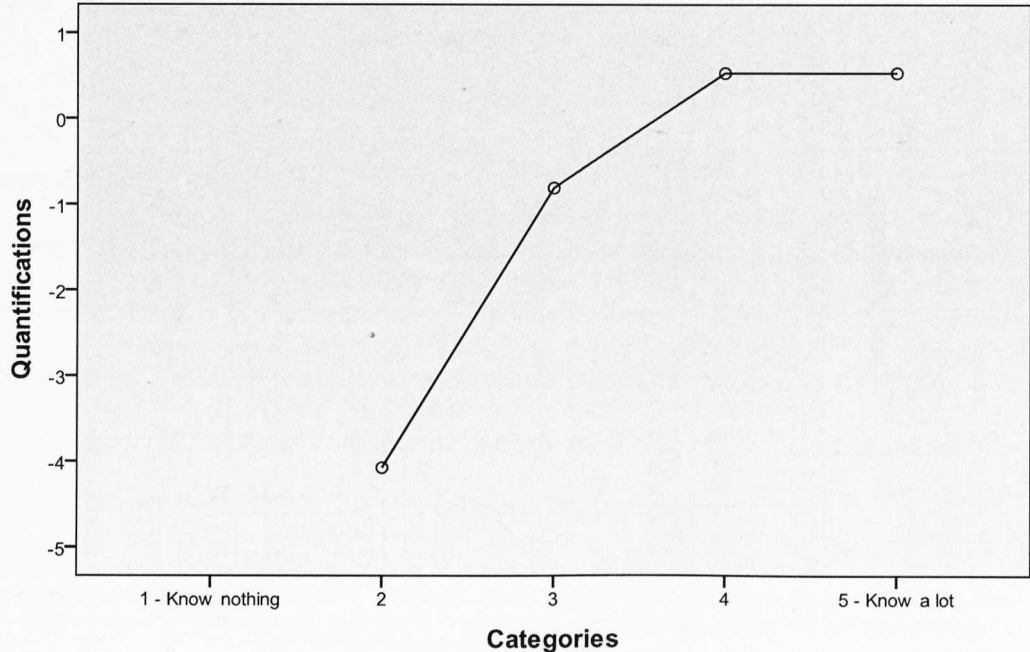
Transformation: Q6. How convenient is it for you personally to recycle your household waste



Optimal Scaling Level: Ordinal.

Beta: .288.

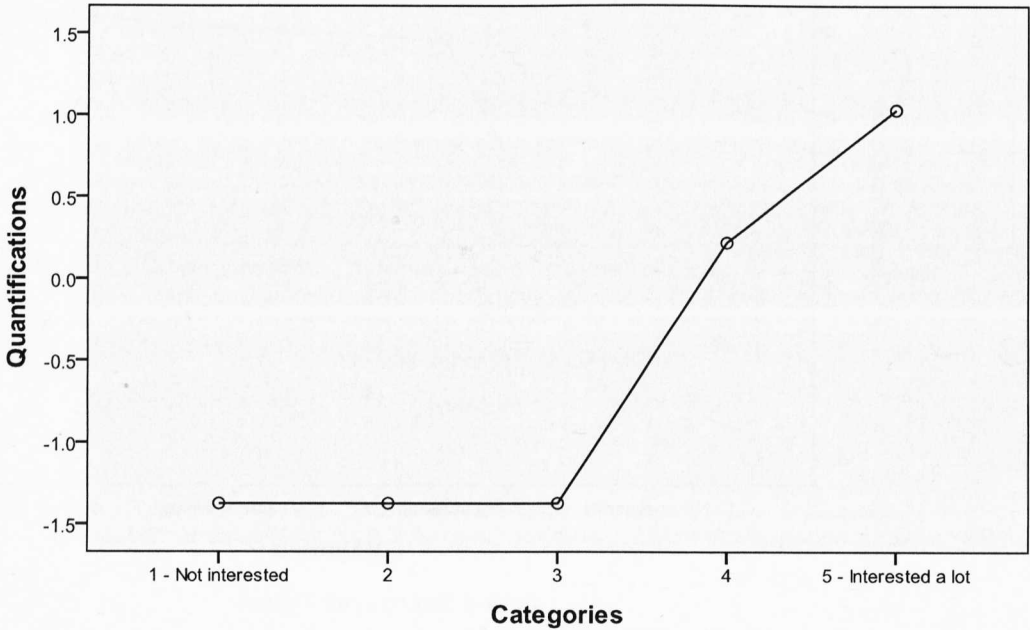
Transformation: Q7. How would you rate your knowledge of how to recycle on a scale of 1 to 5, where '5' is know a lot and '1' is know nothing



Optimal Scaling Level: Ordinal.

Beta: .088.

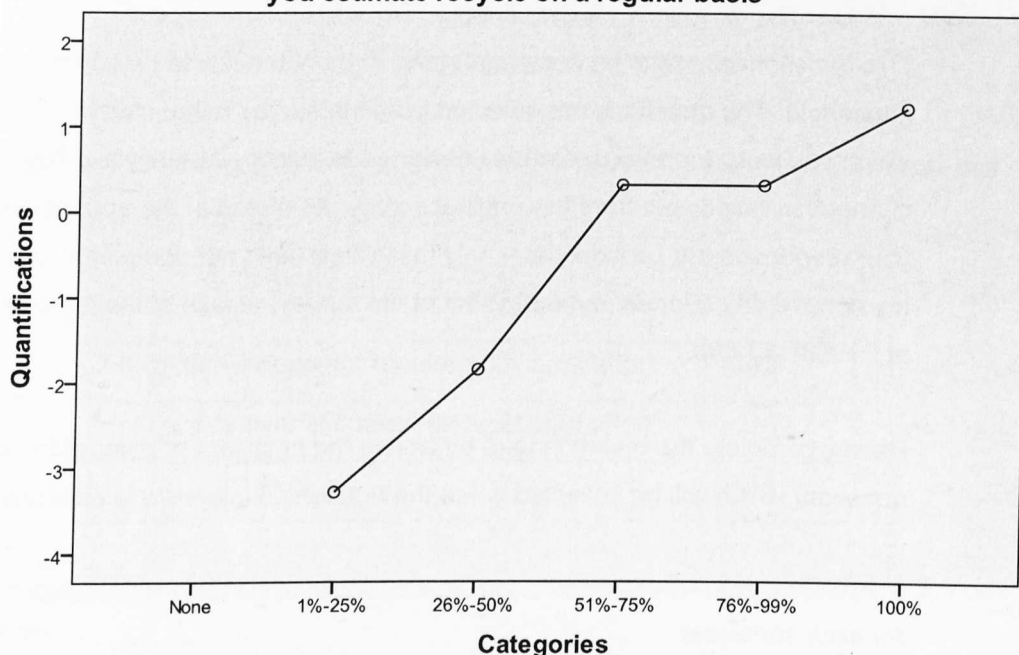
Transformation: Q8. How would you rate your interest of what happens to items sent for recycling on a scale of one to five, where '5' is interested a lot and '1' is not interested



Optimal Scaling Level: Ordinal.

Beta: .049.

Transformation: Q19. What percentage of people in your neighbourhood would you estimate recycle on a regular basis



Optimal Scaling Level: Ordinal.

Beta: .093.

Summary of regression analysis

The above analysis of claimed behaviour using categorical regression suggests that the main influence on recycling behaviour is from convenience of recycling, recycling of glass and recycling of plastic bottles.

The analysis however does not indicate whether this pattern of influence differs based on personal choice. In this regard the use of regression analysis is used to answer the question from Chapter 6 (6.3) "what are the key determinants that influence household recycling behaviour?"

APPENDIX 4: Pre-Interview Questionnaire

This questionnaire is to be completed prior to the interview to be conducted at your household. The questions are selected from the survey conducted in March 2006 of which you were a participant and is designed to identify if there have been significant changes in responses from the original survey. As stated in the accompanying letters your responses are confidential – only myself will see your completed questionnaire. If you have any queries on any aspect of the survey, please contact me Larry Wolfe at 01628 683 598.

Please complete the questionnaire by ticking the appropriate box(es) for each question, which will be collected when the household interview is conducted.

1. Please indicate how concerned you are about each of the following? ***Please tick one box for each statement***

	NOT AT ALL CONCERNED	NOT VERY CONCERNED	FAIRLY CONCERNED	VERY CONCERNED	DON'T KNOW
The effect of climate change / global warming on <u>your life</u>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
The effect of climate change / global warming on <u>your children's lives i.e. the</u> <u>next generation</u>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
The amount of waste / rubbish households dispose of and don't recycle / reuse	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Pollution in your local area	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

2. How important do you think it is to recycle the rubbish that households produce? ***Please tick one only***

Very important	<input type="checkbox"/> 1
Fairly important	<input type="checkbox"/> 2
Not very important	<input type="checkbox"/> 3

Not at all important	<input type="checkbox"/> 4
Don't Know	<input type="checkbox"/> 5

3. Which of the following statements best describes your attitude to recycling? **Please tick one only**

I do not recycle	<input type="checkbox"/> 1
I recycle if it does not require additional effort	<input type="checkbox"/> 2
I recycle even if it requires additional effort	<input type="checkbox"/> 3
	<input type="checkbox"/> 4

4 How convenient is it for you personally to recycle your household waste? **Please tick one only**

Very convenient	<input type="checkbox"/> 1
Fairly convenient	<input type="checkbox"/> 2
Not very convenient	<input type="checkbox"/> 3
Not at all convenient	<input type="checkbox"/> 4
Don't know	<input type="checkbox"/> 5

5. How would you rate your knowledge of how to recycle on a scale of 1 to 5, where '5' is know a lot and '1' is know nothing? **Please tick one only**

1 Know nothing	<input type="checkbox"/> 1
2	<input type="checkbox"/> 2
3	<input type="checkbox"/> 3
4	<input type="checkbox"/> 4
5 Know a lot	<input type="checkbox"/> 5

6. How would you rate your interest of what happens to items sent for recycling on a scale of one to five, where '5' is interested a lot and '1' is not interested? **Please tick one only**

1 Not interested	<input type="checkbox"/> 1
2	<input type="checkbox"/> 2
3	<input type="checkbox"/> 3
4	<input type="checkbox"/> 4

5 Interested a lot	<input type="checkbox"/> 5
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7. Which of the following statements best describes how much you recycle? **Please tick one only**

I do not recycle	<input type="checkbox"/> 1	CONTINUE TO Q8
I recycle sometimes	<input type="checkbox"/> 2	GO TO Q9
I recycle a lot but not everything that can be recycled	<input type="checkbox"/> 3	GO TO Q9
I recycle everything that can be recycled	<input type="checkbox"/> 4	GO TO Q9
Don't know	<input type="checkbox"/> 5	GO TO Q9

8. How often do you use the household recycling collection service operated by the Council? **Please tick one only**

Every week	<input type="checkbox"/> 1
Every other week	<input type="checkbox"/> 2
Once in a while	<input type="checkbox"/> 3
Never	<input type="checkbox"/> 4

9. How often do your neighbours use the household recycling collection service? (Please note that this question is based upon perception i.e. there is no right or wrong answers)? **Please tick one only**

Every week	<input type="checkbox"/> 1
Every other week	<input type="checkbox"/> 2
Once in a while	<input type="checkbox"/> 3
Never	<input type="checkbox"/> 4
Don't Know	<input type="checkbox"/> 5

10. To the best of your knowledge, which of the following household items do you think can be recycled in your area? **Please tick all that apply**

Paper (e.g. newspapers/ magazines)	<input type="checkbox"/> 1
Card/cardboard (e.g. cereal boxes)	<input type="checkbox"/> 2

Glass (e.g. bottles and jars)	<input type="checkbox"/> 3
Food and drink cans/tins	<input type="checkbox"/> 4
Plastics containers (e.g. milk cartons/drinks bottles)	<input type="checkbox"/> 5
Textiles (e.g. clothing)	<input type="checkbox"/> 6
Food waste for compost	<input type="checkbox"/> 7
Garden waste for compost	<input type="checkbox"/> 8
None of the above	<input type="checkbox"/> 9
Don't know	<input type="checkbox"/> 10

11. Looking at this list below, please indicate how often you recycle each of these items when you dispose of them? **Please tick one box for each item**

	Every time	Most times	Some times	Never	Not applicable
Paper (e.g. newspapers/magazines)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Card/cardboard (e.g. cereal boxes)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Glass (e.g. bottles and jars)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Food and drink cans/tins	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Plastic containers (e.g. milk cartons, drinks bottles)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Textiles (e.g. clothing)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
Garden waste for compost	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

What, if anything, motivates you to recycle? **Please tick all that apply**

Reduces "amount of rubbish disposal" (landfill/ incineration)	<input type="checkbox"/> 1
Saves space in my waste bin/ in home	<input type="checkbox"/> 2
Good for environment/ Saves resources	<input type="checkbox"/> 3
Reduces "pollution"	<input type="checkbox"/> 4
Good for the economy	<input type="checkbox"/> 5
Good for future generations/ children	<input type="checkbox"/> 6

Feel guilty if don't/ better if I do	<input type="checkbox"/> 7
Because it's easy/ no extra effort	<input type="checkbox"/> 8
Because my friends and neighbours do	<input type="checkbox"/> 9
Don't know	<input type="checkbox"/> 10
Other (please specify)	<input type="checkbox"/> 11
Nothing – don't do it	<input type="checkbox"/> 12

Thinking now about the local area in which you live.

Do you agree or disagree that you can influence decisions that affect your area? ***Please tick one only***

Strongly Disagree	<input type="checkbox"/> 1
Disagree	<input type="checkbox"/> 2
Not sure	<input type="checkbox"/> 3
Quite Agree	<input type="checkbox"/> 4
Strongly Agree	<input type="checkbox"/> 5

Overall how involved do you feel in the local community? ***Please tick one only***

Not at all	<input type="checkbox"/> 1
Not very much	<input type="checkbox"/> 2
A fair amount	<input type="checkbox"/> 3
A great deal	<input type="checkbox"/> 4
Don't Know	<input type="checkbox"/> 5

Many thanks for taking part in this survey. Please place it in the attached envelope and it will be collected by Mr Wolfe on the day of the household interview

APPENDIX 5: List of Acronyms and Abbreviations

Acronym	Description (and explanation where required)
ABC	Attitude – Behaviour – Context – Stern and Oskamp (1987)
ACORN	A Collection of Residential Neighbourhoods
AWC	Alternating Weekly Collection
AD	Anaerobic Digestion
BMG	Bostock Marketing Group – market research consultancy based in Aston, Birmingham, UK
BMW	Biodegradable Municipal Waste
BVPI	Best Value Performance Indicators
CA	Civic Amenity Site
CI	Confidence Interval
CIPFA	Chartered Institute of Public Finance and Accountancy
DPA	Data Protection Act
DEFRA	Department of Environment Food and Rural Affairs - UK
DCLG	Department of Communities and Local Government - UK
EA	Environment Agency (England and Wales)
EC	European Commission
ELM	Elaboration Likelihood Model – Petty and Cacioppo (1981)
EV	Expectancy-Value – theory (Fishbein (1973)
ETRA	Expanded Theory of Reasoned Action
FAI	Feelings As Information –model by Schwartz and Clore (1983)
EU	European Union
FOI	Freedom of Information
HDPE	High Density Polyethylene
HHW	Household Hazardous Waste
HRC	Household Recycling Centre
ISB	Infrastructure Service Behaviour - by Timlett and Williams, (2011)
LBC	London Borough Council
MAB	Model of Altruistic Behaviour – Schwartz (1977)
MRF	Materials Recycling Facility
MOA	Motivation Opportunity Abilities –Olander and Thogerson (1995)
MOP	Multiple Occupancy Property
MOSAIC	Socio-demographic classification system marketed by Experian
MORI	Ipsos MORI – market research consultancy
NEP	New Environmental Paradigm – Dunlap and Van Liere (1988)
NI	National Indicators
ONS	Office for National Statistics
PIQ	Pre Interview Questionnaire
PBC	Perceived Behavioural Control
PET	Polyethylene Terephthalate
RBWM	Royal Borough of Windsor and Maidenhead
RRF	Resource Recovery Forum
SEU	Subjective Expected Utility
SPSS	Statistical Package for Social Scientists – statistical software
TIB	Theory of Interpersonal Behaviour – Triandis (1977)
TPB	Theory of Planned Behaviour – model by Ajzen and Madden (1986)
TRA	Theory of Reasoned Action – model by Fishbein and Ajzen (1977)
UK	United Kingdom
US	United States of America
WCA	Waste Composition Analysis
WDA	Waste Disposal Authority

WEEE	Waste Electrical and Electronic Equipment
WODC	West Oxfordshire District Council
WRAP	Waste and Resources Action Programme
Abbreviation	Description (and explanation where required)
AC	Awareness of Consequences (from MAB model)
AR	Ascription of Responsibility (from MAB model)
A_{ube}	Attitude toward an object from Expectancy-Value theory
b_i	Beliefs or expectancy – from Expectancy -Value theory
CATREG	CATegorical REGression
circa	Circum - around
Ec	Evaluation of consequences of an action– from TIB
e.g.	For example
e_i	Evaluation of the characteristics – from Expectancy – Value theory
et al	Et alia – and others
etc	Et cetera – and so forth
I & S	Infrastructure and service provision
ibid	Ibi.dem – in the same place
kg	Kilogrammes
kg/hh/wk	Kilogrammes per household per week
mm	Millimetres
Pc	Perceived consequences of an action – from TIB
tpa	Tonnes per annum